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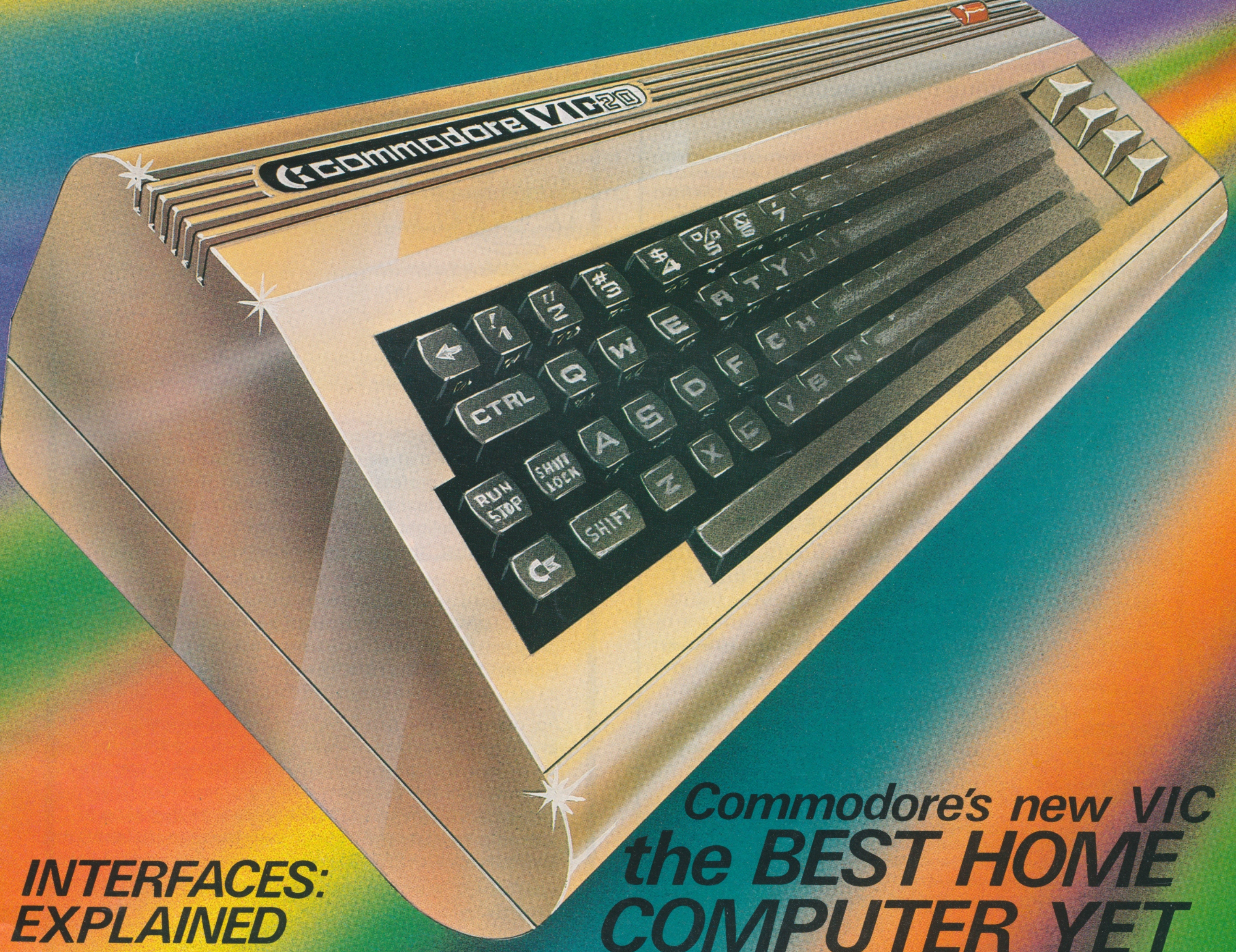
All about the PET, CBM & VIC Computers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Vol.2 Number 4 May 1981 95p

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Now available the new OSBORNE-McGraw Hill PET/CBM Personal Computer Guide covering basics 1-4 discs and printers as well as the PET itself, all at the same price!

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BASIC 4 gives your new ROM PET all the commands of the new 80 column PETs. DOS 2 goes in your disk drive and is necessary when using BASIC 4 or may be used on its own to get rid of initialisations every time you use a disk. Both sets are priced at £43.70 inc. VAT + 50p P+P each.

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the BEST HOME COMPUTER YET
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Editorial

Here in the PRINTOUT *offices, we have a pressing problem. We've lots, actually, but some press less than others. The one which exercises us most, in our on-going intent to give you the best magazine for your money, is what might reasonably be labelled the* PRINTOUT *pudding.*

Now let me say right away, lest 'pudding' conjures up mental images of the stodge you used to push quietly behind the radiator at lunch-time in school, that I'm using the word in its recipe sense. That's to say, the ingredients that go into each issue.

Are we technical enough? Or too much so? Do we pay sufficient attention to the needs of business users? Or too little? Is there sufficient of the tutorial approach? Or not enough? Program listings? Too many or too few? Hints and tips? Overdone or underdone? General balance of contents? Too baffling for beginners or too patronising for professionals?

Clearly it's important for us (and you!) to get the recipe right as often as we can, but cross our PET's and hope not to crash, it's hard! You see, we know our reading audience represents an incredibly wide spectrum. That's because PET users themselves come from all walks of life; represent almost every known job or profession; use their PETs for more tasks than we can even guess at; and are at every conceivable stage of user-development, from the "just-got-it-out-of-its-box" to the "here's-my-latest-27K-machine-code-program".

Now Lincoln's words (you know the ones: satisfy some all of the time, all some of the time; but never everyone all the time) haunt us, for when you're running a magazine which goes to such a wide range, you have a problem.

The one and only way we can keep a finger on the pulse of what you like; what you want; what we do right and what we do wrong; is to read your reactions. And these, of course, we get from your mail to us. Of which there's a great deal, thank Heavens!

So this editorial is simply a request. Keep writing. In fact, do it more often and, if you wish, more forcefully. Let us have your ideas and suggestions. Ask your questions. Make your comments. Give your needs.

Every letter gets read, and by all of us here in the editorial offices, not just one or two. Many have resulted in one or other of our contributing editors, or other regular correspondents, including material which might not otherwise have gone into our pages.

It's a tired old cliche, but it is your magazine and your feedback to us helps shape the very next issue, and the one after that, and the one after that, and so on.

We've grown one heck of a lot since our first, very slim, Number One issue. And we plan to carry right on with that process. There's one certain way of guaranteeing that.

That's what this editorial is all about! T.H.

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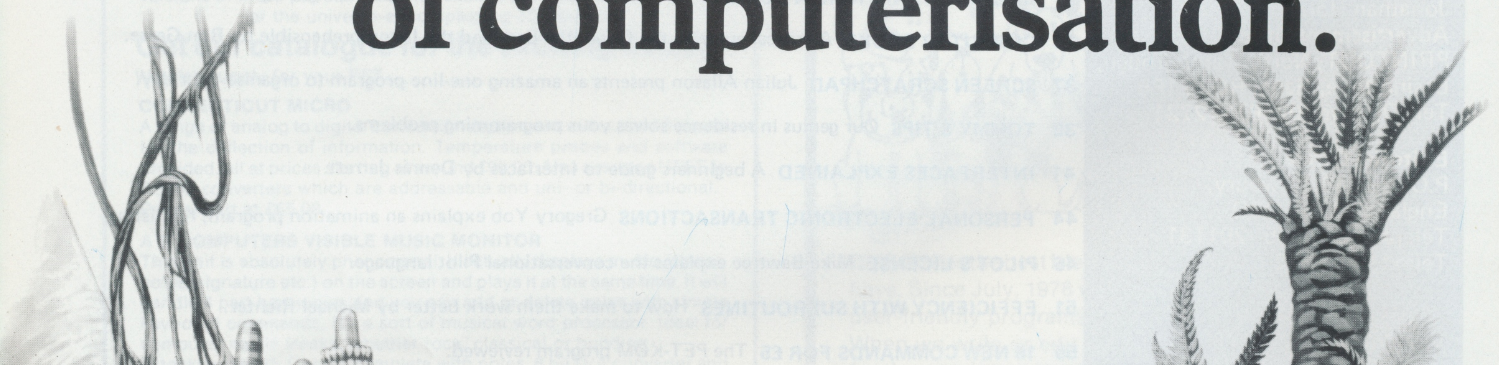

The miracle of microchip technology has made the main-frame computer seem like a dinosaur. But how many microcomputers will go the same way?

Without good software and support a microcomputer is less capable than your office calculator. So as competition grows amongst manufacturers in this industry, only those with the finest software and the best supporting facilities will survive.

SHARE A SECURE FUTURE WITH A COMMODORE PET

We at Commodore have been producing high technology products for over 20 years. And unlike most other manufacturers of micro-computers, we make everything ourselves (including the silicon chips) to keep our costs to a minimum.

These cost savings are passed on to you in excellent value for money. So you can now buy a self-contained Commodore PET microcomputer for **£450**, or a complete business system (including Floppy Disk Unit and High Speed Printer) starting from as little as **£2000**.*

However, computer hardware can only be as good as the software available. That's why, to maintain our position as

Britain's most popular microcomputer, we have made sure that the quality and versatility of our software is second to none.

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To complement our microcomputers, we have the finest and most comprehensive range of programs available in the U.K. today. This covers everything from such important business applications as Payroll, Stock Control, Accounting, Filing, Mailing; to our series in the field of Education. Each program is thoroughly tried, tested and tailored to BRITISH needs. You won't catch us palming you off with an irrelevant American version!

…AT SURPRISINGLY LOW PRICES

With over 30,000 Commodore PETs employed in Britain, the demand for programs is tremendous. And through mass-production we are able to keep our costs to you surprisingly low. So you can buy a Petpack program (on cassette) for between £5 and £50, while business programs (on disk) range from between £50 and £500.

OUR OWN UNIQUE TRAINING COURSES

Commodore programs are designed with operational simplicity in mind. Commands are in plain English and guidance is built into each package. So that even a stranger to computers can quickly feel at home with a PET.

Nevertheless, to maximise the potential of your Commodore system, you will find a certain amount of training of immense value. Of the well-known names in microcomputers, Commodore is the only one to offer a range of training courses and seminars. And these have already proved of great benefit to thousands of PET users.

KEEP IN TOUCH WITH THE PET USERS' NEWSLETTER

Another unique way in which Commodore helps you get the most out of your microcomputer is by publishing the regular PET Users' Newsletter. For an annual subscription of only £10 you can keep up-to-date with developments and share new ideas and applications with over 3,000 PET users.

WORDPROCESSOR AS WELL AS COMPUTER

In addition to Commodore's own high quality range of hardware and software, there are compatible products of other manufacturers which have gained our official stamp of approval.

Look out for this sign. OFFICIALLY APPROVED BY COMMODORE

You'll find it on such famous programs as WORDPRO and WORDCRAFT, which turn your PET into a first-class wordprocessor; as well as on hardware like the MUPET system, which allows a number of PETs to be run with a single, letter-quality printer.

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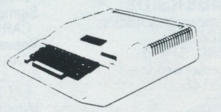

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> ″ **Conclusions**
> A *very well thought-out program* that is *very user friendly.* I am sure this program is going to be a very useful tool in many firms, both small and large. And it's good to see a degree of excellence and professionalism in material for the PET. It has the added attraction that *no knowledge of programming languages is needed for the operator.* All this is available at a *very modest price* and must represent *good value for money.* The facilities available are very good and it is seemingly impossible to crash the system.″

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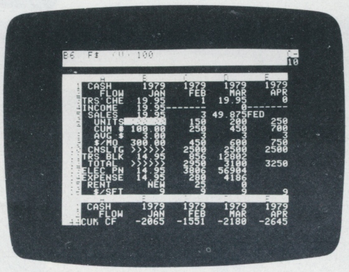

```
B6  F$  (V) 100                                   C-
                                                  10
     A         B        C        D        E
 1 CASH      1979     1979     1979     1979
     FLOW     JAN      FEB      MAR      APR
   TRS CHE  19.95        1    19.95        0
   INCOME   19.95-------        0-------
    SALES   19.95        3   49.875FED
    UNITS              150      200      250
     CUM #  100.00     250      450      700
     AVG $    3.00       3        3        3
     $/MO   300.00     450      600      750
    CNSLTG  >>>>>>    2500     2500     2500
   TRS BLK   14.95     856    12802
    TOTAL   >>>>>>    2950     3100     3250
   ELEC PN   14.95    3806    56904
   EXPENSE   14.95     280     4186
    RENT       NEW      25        0
     $/SFT       9       9        9        9
     A         B        C        D        E
   CASH      1979     1979     1979     1979
     FLOW     JAN      FEB      MAR      APR
   CUM CF    -2065   -1551    -2180    -2645
```

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No Modem Bug

After *much* investigation we have decided that the only modem which is any good for the PET is the 8010 – quite the reverse of what people are saying. All this talk of a modem bug is rubbish. The only truth is that the 8010 is somewhat smarter than the PET. The 8010 uses the SRQ line on the PET. Our experiments show that the 8010 is *very* reliable and *never* loses characters on transmission or reception. It just has to be used properly. The secret is never to try to get a character from the modem unless it says it has one. When a character comes into your modem from the telephone, it sets the SRQ line high. You can check for the SRQ line in BASIC by A=Peek(59427) AND 128.

Mike Whitehead,
Bristol Software Factory,

Incredible Unwordprocessor Revisited

In *PRINTOUT* Vol.2 No.2, Lindsay Doyle describes his Incredible Unwordprocessor. In fact both his Catch 1 and Catch 2 can be overcome using the following simple program:

```
10 OPEN 1,4:CMD 1
20 PRINT"TEXT"
30 PRINT"MORE TEXT, ETC"
```

Since PRINT can in this case be typed as '?', it hardly takes any longer to type in '?" ' following the line number. As with Lindsay Doyle's proposal it is, of course, necessary to end with PRINT# 1:CLOSE1. To prove it this letter has been produced using the above method.

R. C. Armstrong,
148A Camberwell Grove,
London SE5 8RH

Lindsay Doyle replies: Congratulations! I think that Mr. Armstrong forgot to specify that a cursor-down symbol must be included after the first quotation mark in each line of text in his technique, to reset the printer into lower-case mode. Also the commands PRINT 1: CLOSE1 can now be the last numbered line of the program, thus making "READY" appear on the screen rather than the printout!

LIFEmanship

As author of the new version of the game of "LIFE" recently released by Commodore, I would like to pass on two items of information to those of your readers who have already purchased this program.

Firstly, there is a small bug in the current version of the program which prevents writing of cells to the right-most array column when operating on the 8032. For somewhat obscure reasons, the problem does not exist on the 40-column screen machines. The "fix" is as follows, and can be inserted, saved, etc., using the machine language monitor.

Location (Hex)	Old Contents (Hex)	New Contents (Hex)
07DD	6D	18
07DE	C2	6D
07DF	OC	C2
07E0	8D	OC
07E1	C8	AA
07E2	OC	CA
07E3	CE	8E

In the light of the above, the program can truly be described as "bug free" – as you are no doubt aware, there is an important semantic difference between "Fully Debugged" and "Bug Free".

Many thanks by the way, to Gavin Sanders, for his enthusiastic comments about this program in PETS & PIECES, April issue.

Finally, also relating to the April issue, in the "State of the Art Report" on multiple PETs, Dennis Jarrett refers to Pete Dowson of Davidson-Richards as being "responsible for *(Wordcraft* and) most of the PET comms software on offer in the U.K. today". I would respectfully refer Dennis Jarrett to his previous "State of the Art" report on communication products, where, out of a total of 7 products described, no less than three originated from Cortex Computer Systems Ltd., while two are attributable to Pete Dowson.

As one of the four authors within Cortex (the other three are Howard Johnston, Bob Watson and Nicky Hammond) jointly "responsible for most of the PET comms software on offer in the U.K. today", I feel that perhaps you should put the record straight.

Tony Jeffree
Cortex Computers Ltd.,
34/36 Bromham Road,
Bedford

Salutations to Tony & Co., although anyone who read the comms report (March) will already be aware of their contribution to better communications. We would also like to single out Howard Johnston for special thanks for his contribution to that feature.

Pooper Scooper Solved

I want to spread knowledge wherever I can and so take PET in hand to write with the greatest possible speed to advise you that a Super Duper Pooper Scooper is a patented American device for picking up dog turds without coming into actual contact with them, so help me, God! The reference is to Neil Hewitt's letter in Vol.2 No.2, p.11 and the Editor's reply thereto.

Lindsay Doyle,
Palace Hotel,
St. Moritz, Switzerland

Butterfield Speaks

Re your report on Multi-User systems (April): I am fixated with the concept that small micros are here to get us out of the horrible multi-user environment. Thank God for the On-Off switch! Sharing databases via things like MUPET is sensible where needed, of course. But I believe in one man, one computer. (No sexism implied).

Jim Butterfield,
Toronto,
Ontario, Canada.

Netkit Not Complicated

With reference to your article on 'Pet Communications', and in particular the Kingston Netkit, we would like to clarify a few points, as the inference was that dealers at the Commodore Communications Meeting felt that *Netkit* is perhaps a bit too clever for instant comprehension and that it was difficult to find some applicability.

One of the greatest difficulties we have confronted in the presentation of the *Netkit* has been pointing out its capabilities, without being able to show it working in its numerous live situations. The device is currently providing communications between the PET and IBM, ICL, Data General, Rair, Harris, HP and numerous other processors and peripherals, not to mention other PETs; it is difficult to 'tell all' let alone 'show all'.

Discussion of the SERIAL BASIC command !LOAD should illustrate our dilemma: in essence !LOAD allows a series of ASCII characters to be collected from an external device and stored in sequential locations in memory, with a starting point being determined by reference to the start of variables pointer (43, 42). By logical association we pair it in our literature with a second command, !READ; this tokenizes and merges a !LOADed program. The casual reader might be excused for supposing that an exclusive, albeit powerful, command combination was implied. Nothing could be further from the truth.

In a 16K PET with a 2K manipulative program at the bottom of memory the back-of-BASIC pointer would show the value 12 and zero, i.e. a HIByte of 4 (start of Basic text) + 8 (2K of text/256 Byteblocks). The start-of-variables pointer (53) would have 64 and zero, i.e. HIByte of 16K/256 and a zero LOByte, indication that variables started at (256 x 12) + (1 x 0), namely 3072 and the Basic area ended at (256 x 64) + (1 x 0), 16384.

To halve the value in 53 effectively creates an 8K PET, which would be more than adequate for the 2K program and leave 6K for storage.

Now by definition !LOAD operates in memory between the start of variable and end of Basic pointer. So if we redefine our area of interest in the memory by moving up the values in 43 and 42 to the mid-point and re-establishing the power up values in 53 and 52, we can open an entirely new area in the top of memory. Yet still we can maintain a Basic program and all its supporting data undisturbed at the bottom.

So what might we !LOAD into the reserved area? And what might the manipulative program initially proposed actually do? The data could be a chunk of 'warts-and-all' mainframe data with unlimited record lengths and all the characters that would normally make a PET rebel, supported by a program that PEEKed and sorted the data into PET-consumable format.

Or it could be the output of a serial A/D device, configured to make periodic reports to a printer and paired to a 'trimmings stripping' program with graphical analysis and disk logging options. Or a mix of service requests, program upgrades and data, either strung and labelled or in an unlabelled block, can be sequentially incorporated and operated upon with the simple !READ entry.

To summarize: except in the hobbyist market and insular small business systems, the ability to use an inexpensive PET as an intelligent terminal or a simple communications device must surely be accepted as a concept which is both desirable and realistic using *Netkit*.

John Chew,
Chairman,
Kingston Computers.

We showed your letter to Dennis Jarrett, who edited our comms report. He comments: John Chew's letter certainly demonstrates that I got it all wrong when I suggested Netkit *might be a bit complicated. Sorry.*

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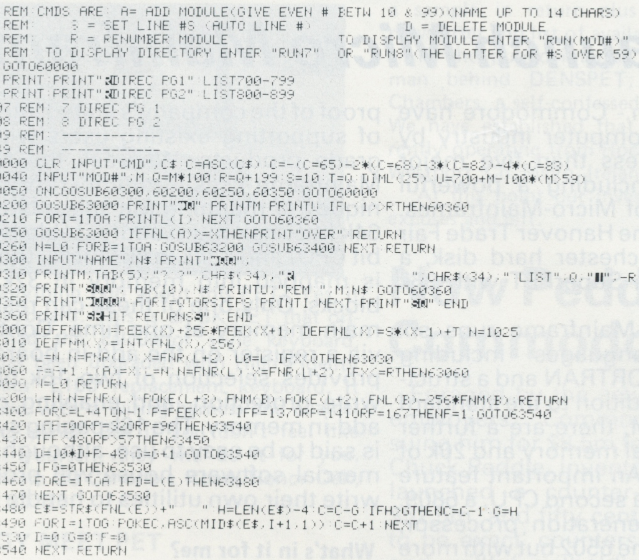
MPAK Repackaged

I am a very recent subscriber to *PRINTOUT*, having just sent for, and received, all the back numbers. It is interesting to see how the magazine has improved since it started. One thing you have learned is that the only safe way to publish programs and routines is by photoreproduction of actual listings. In the January 1980 issue is an interesting program called "MPAK" which I decided to try out. The result was hopeless because the list omitted all the programmed cursor movements, which are essential to the correct working of the program. Anyway, I have deduced the missing cursor movements and added them, together with a few other small cosmetic touches. I enclose a printout which you might like to consider printing in your next issue (by photocopy!)

Terence Dwyer,
Consultant Astrologer,
53 Loughborough Road,
Quorn, Loughborough.

Many thanks for the corrected listing, Terence.



```
0 REM CMDS ARE  A= ADD MODULE(GIVE EVEN # BETW 10 & 99)(NAME UP TO 14 CHARS)
1 REM     S = SET LINE #S (AUTO LINE #)              D = DELETE MODULE
2 REM     R = RENUMBER MODULE              TO DISPLAY MODULE ENTER "RUN(MOD#)"
3 REM  TO DISPLAY DIRECTORY ENTER "RUN7"  OR "RUN8"(THE LATTER FOR #S OVER 59)
4 GOTO60000
7 PRINT:PRINT"█DIREC PG1":LIST700-799
8 PRINT:PRINT"█DIREC PG2":LIST800-899
707 REM: 7 DIREC PG 1
708 REM: 8 DIREC PG 2
709 REM: ------------
749 REM: ------------
60000 CLR:INPUT"CMD";C$:C=ASC(C$):C=-(C=65)-2*(C=68)-3*(C=82)-4*(C=83)
60040 INPUT"MOD#";M:Q=M*100:R=Q+199:S=10:T=Q:DIML(25):U=700+M-100*(M>59)
60050 ONCGOSUB60300,60200,60250,60350:GOTO60000
60200 GOSUB63000:PRINT"██":PRINTM:PRINTU:IFL(1)>RTHEN60360
60210 FORI=1TOA:PRINTL(I):NEXT:GOTO60360
60250 GOSUB63000:IFFNL(A)>=XTHENPRINT"OVER":RETURN
60260 N=L0:FORB=1TOA:GOSUB63200:GOSUB63400:NEXT:RETURN
60300 INPUT"NAME";N$:PRINT"███";
60310 PRINTM;TAB(5);"?:?";CHR$(34);"█           ";CHR$(34);"LIST";Q;"█";-R
60320 PRINT"███";TAB(10);N$:PRINTU;"REM ";M;N$:GOTO60360
60350 PRINT"████":FORI=QTORSTEPS:PRINTI:NEXT:PRINT"██":END
60360 PRINT"██HIT RETURNS█";:END
63000 DEFFNR(X)=PEEK(X)+256*PEEK(X+1):DEFFNL(X)=S*(X-1)+T:N=1025
63010 DEFFNM(X)=INT(FNL(X)/256)
63030 L=N:N=FNR(L):X=FNR(L+2):L0=L:IFX<QTHEN63030
63060 A=A+1:L(A)=X:L=N:N=FNR(L):X=FNR(L+2):IFX<=RTHEN63060
63090 N=L0:RETURN
63200 L=N:N=FNR(L):POKE(L+3),FNM(B):POKE(L+2),FNL(B)-256*FNM(B):RETURN
63400 FORC=L+4TON-1:P=PEEK(C):IFP=137ORP=141ORP=167THENF=1:GOTO63540
63420 IFF=0ORP=32ORP=96THEN63540
63430 IFP<48ORP>57THEN63450
63440 D=10*D+P-48:G=G+1:GOTO63540
63450 IFG=0THEN63530
63460 FORE=1TOA:IFD=L(E)THEN63480
63470 NEXT:GOTO63530
63480 E$=STR$(FNL(E))+"    ":H=LEN(E$)-4:C=C-G:IFH>GTHENC=C-1:G=H
63490 FORI=1TOG:POKEC,ASC(MID$(E$,I+1,1)):C=C+1:NEXT
63530 D=0:G=0:F=0
63540 NEXT:RETURN
```

DISK CORRUPTION: How to Beat It.

I have a 32K new ROM PET with 3040 Dual Disk Drive and 3022 Commodore printer. I have had trouble with disk corruption, the commonest result being that the BAM (Block Availability Map) on the disk gets mixed up and produces the wrong blocks for the file requested, sometimes to the extent of beginning correctly to serve up a program and then giving a slice of a sequential file — and then giving up of course. I have irretrievably lost programs and data this way. What is the most likely cause? Does this sound like a hardware fault?

Secondly, I have made a practice of leaving all three machines with current switched on permanently, to avoid the shock of power surge which I understand is bad for the components. Do you agree that this is a good idea? I avoid any chance of the screen burning by entering "O Print E$:RUN" on top of a resident program, and then entering "RUN" direct. Easily removed next day if I wish to continue with the same program.

Thirdly, I have used my printer for over a year with few problems, but it occurs to me that no mechanical device can run indefinitely without lubrication or other maintenance. Needless to say, the Commodore Manual is silent on this. Have you any advice?

Terence Dwyer,
53 Loughborough Road,
Quorn, Loughborough.

We consulted Commodore's corruption specialist, genial Dave Middleton, about your disk problems. Our thanks to him for a prompt and positively encyclopaedic response:

1. One of the easiest ways of corrupting a disk is to put a disk created on DOS2.1 into a 3040 with DOS1 and then write something to it. One of the first things to happen will be the disk corruption and later, when the disk is accessed, it will either fail to initialise or parts of the directory will be corrupted.

Solution: Under no circumstances attempt to write to a disk created on DOS 2.1 when your 3040 has DOS1. DOS2.1 will not allow you to write to DOS1 disks. You will be quite safe reading the disk created on an alternative DOS.

2. Saving a program, or opening a file to disk without specifying a drive number. DOS puts the program on one drive and updates the BAM (Block Availability Map — i.e. which blocks are free on the disk) on the other drive; this can cause corruption of both drives.

Solution: Always specify a drive number when saving programs. I believe that this is the most common cause of disk corruption because it is so easy to forget to give a drive number when in a hurry.

3. Trying to write to a disk with a write protect tab will not cause corruption of the protected disk but may corrupt the next disk put in the drive because at least one write will always be performed.

Solution: Always power down the disk system and start again.

4. If an error is detected during a validate command, which creates a BAM according to what is actually on the disk, then the BAM is left in an intermediate state. Validate will also free any sectors which have been allocated for random access.

Solution: If an error is detected then re-initialise the disk to restore the correct BAM. Do not use validate if you are mixing random access files and program files (it's not a very good idea anyway).

5. The old favourite is Save with Replace. Most people have their own theories about this command and why it sometimes fails. I think it only crops up when another incorrect command has been given (especially No.2), or when the disk is getting very full, thus making the file chain jump around the disk. The result is programs which get their links mixed up or extended, thus making bits of other programs or sequential files tag onto the end of the one which has been replaced.

Solution: Since the actual cause of the bug is obscure, it is a little difficult to offer a solution, but I have used Save with Replace for a considerable time on one specific disk without failure. My method is only to scratch files from the disk when it is getting rather full, and follow the scratch with a validate; sometimes an extra block will be freed. Jim Butterfield says that scratching unclosed files (i.e. those marked with an asterisk) can cause corruption of other files on the disk, so use the validate command to get rid of these.

There are other bugs in DOS1.2 (standard 3040) but the above are the only ones which, to my knowledge, can cause actual disk corruption. DOS2.1 and DOS2.5 are both free of faults in this area but the following bug was discovered in the relative records system and should be noted by anybody considering using the relative records.

When the Relative records system is being used and two are files open at the same time DOS can get confused when, having made accesses to both files, it is then requested to write data back to the first file; it sometimes forgets to update the disk for a few records. The solution is to close and then reopen the relative file before writing to it.

Due to the low power requirements of a micro such as the PET, power surge is not something which is going to cause problems. PET's can end up in some fairly strange environments which may be cold or damp and this can lead to some expansion and contraction of the circuit boards, reducing the life slightly, but in general Britain's climate is such that the PET can be switched off without fear of causing damage. If you do intend leaving the PET on for considerable lengths of time without actually running anything, then the idea of clearing the screen is probably sensible, but most people have the brightness turned right down anyway so there is little chance of screen damage occuring.

The printer is a very robust device with very few moving parts. The print needles are the only item likely to be moving very much and they gain their lubrication from the ribbon which is oil based. This is why it is important to use the ribbons recommended for the printer. It may seem like a good idea to use a cheap, standard ink ribbon, but when a needle jams due to overheating, and a small fortune has to be spent buying a new head, remember the pennies you saved. The printer will eventually need to be serviced and when it is, the various other moving parts will be greased.

Dave Middleton

CBM Launch Micro Mainframe

Hanover April 9th.- Commodore have astonished the computer industry by announcing no less than five major new products, including a powerful new generation of Micro-Mainframes. Also unveiled at the Hanover Trade Fair were a mini-Winchester hard disk, a colour PET and a SuperPET with 96k bytes of RAM.

The Micro-Mainframe runs six programming languages including Pascal, COBOL, FORTRAN and a structured BASIC. In addition to the standard 32k bytes of RAM, there are a further 64k bytes of virtual memory and 20k of additional ROM. An important feature is the addition of a second CPU, a 6809. This is a later generation processor, compatible with the 6502 but with more powerful instructions. The effect is to give the language system programmer multiple base pages, better stack management and, above all, 16 bit instructions. The standard 6502 is retained so that the Micro-Mainframe can run existing PET software. The system operates only one micro-processor at a time, selection being by either hardware or software. Both processors can address the lower 32k of RAM and the virtual memory. However the 6502 can only address its own ROMs, and the same is true of the 6809.

The Micro-Mainframe is the result of a partnership between Commodore, BMB Compuscience, the Canadian Company who developed MUPET, and the University of Waterloo, where the work was carried out. The project originated at Waterloo where microcomputers were in use as front end processors for large mainframe sytems. The University, already well known for the languages developed there, will be supporting the Micro-Mainframe with software and documentation. The languages have already been subjected to a test stream of several hundred programs, and then submitted to a full term of use by many of the 20,000 students. Professor Wes Graham told PRINTOUT that there were already a number of existing Waterloo texts and that they were working on textbooks for teaching.

Behind this thrust into an area hitherto considered the sacred preserve of established mainframe and mini-computer manufacturers will be seen the hand of Commodore's new President, ex-Data General Vice President, Jim Finke. More significantly, it means that the company now cover the entire market from low-cost home computers up to a fully fledged macro system. The possibility of developing software for large mainframes on inexpensive micros is sure to appeal to universities and other large users. In theory at least, each model will be upwardly software compatible, so sales of machines towards the lower end of the range should also receive a boost.

The release of the 8096 additional 64k RAM board will also be seen as proof of the company's stated intention of supporting existing users with upgrade products. Whereas the Micro-Mainframe uses virtual memory techniques of mapping the space between 64k (the maximum addressable by an 8 bit CPU) and 134k in 4k blocks, the 8096 is mapped into memory in 32k byte blocks. Only one of these can reside in main memory at one time. Control is via a register on the add-in board that provides selection of two 16k blocks, write protection, and enabling of the add-in memory. The 16k paging system is said to be easy to use, although commercial software house will probably write their own utilities to handle it.

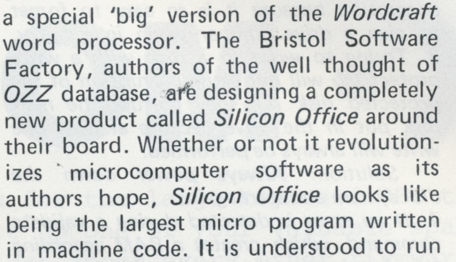
What's in it for me?

So what are the advantages of three or four times as much RAM? It could mean *Wordcraft* operating with fifteen pages of text in RAM at one time. Or *VisiCalc* with a simply *gigantic* worksheet. These are examples of the simple answer – the extention of existing popular packages to use the extra RAM for much larger areas of working storage.

PRINTOUT has learned that two leading PET software houses have managed to obtain prototype 8096 boards. Dataview are believed to be working on a special 'big' version of the *Wordcraft* word processor. The Bristol Software Factory, authors of the well thought of *OZZ* database, are designing a completely new product called *Silicon Office* around their board. Whether or not it revolutionizes microcomputer software as its authors hope, *Silicon Office* looks like being the largest micro program written in machine code. It is understood to run to 25,000 lines, or about 50K bytes of program. Clearly a project of this scale would be impossible without a machine like the 8096.

PETAID LIVES!

Despite its omission from the Data Management category of our survey of business software, *PETAID* is alive and well and living in Bournemouth. What's more, the latest version now links to *Wordcraft* and *VisiCalc*. Details from Stage One Computers, 6 Criterion Arcade, Old Christchurch Road, Bournemouth.



64K RAM AVAILABLE NOW

Hold on to your hats, the great RAM race is hotting up. First in the marketplace is MTU with a 32K add-on RAM ROM I/O board called the Banker. Not only does it have 32K of low power dynamic RAMs individually addressable in 4K blocks, but there are also 4 ROM sockets for up to 16K of additional ROM.

In the normal course of events 32K of RAM is the maximum the PET can address in BASIC, although 8K of additional plug-in RAM can be accessed by machine code. One way of overcoming this limitation is by switching different banks of memory in and out; that way BASIC is still only addressing 32K of RAM at any one time.

Well, the Banker has not one but two kinds of bank switching right there on the board. It works by dividing the RAM and ROM into four blocks each (8 total) and an Enable register determines which blocks respond; in this way two or more blocks can be at the same address. The bad news is that PET BASIC does not automatically perform bank switching, although a BASIC program can by issuing a series of POKEs.

The second solution is somewhat more complicated, as it concerns the extention of all address recognition logic to 18 address bits. Just take our word for it that this will make the Banker compatible with the 18-bit address bus 6502 boards systems of the future.

Finally, two other intriguing features: The Banker has 4 parallel Input/Output ports implemented with 6522 VIAs and its own EPROM programmer for 5 volt 2716 and 2732 EPROMs. It costs £295 (plus interface as required) from IJJ Design, 37 London Road, Marlborough, Wilts.

MUPET UPDATE

Following our State of the Art Report on multiple PET systems (April), we would like to make it clear that MUPET allows as many shared IEEE devices as required to be attached to the controller unit, subject only to the availability of device addresses. MUPET needs a single 12 volt power supply built into a 13 amp plug for the complete system.

SINISTER BOX

Perhaps you are wondering about the sinister looking device lurking in front of PET's screen. It is a new EPROM programming system for the PET. EPROM stands for Erasable Programmable Read Only Memory.

PET's operating system and BASIC Interpreter are stored on Read Only Memory (ROM) chips. Which is fine because Commodore manufacture them by the thousand. Where a smaller number of permanent memory chips is required, a Programmable Read Only Memory or PROM is usually used. Once the program has been programmed onto the PROM, it stays there. The trouble is PROMs can't be changed. So EPROMs are often used. Exposure to ultra violet light wipes them clean, ready to be reprogrammed. Which is where we came in.

The Davidson-Richards system comprises the sinister box, which connects directly to PETs user and cassette ports, and a disk containing a machine code program to give a fast writing speed.

Data can be read into the system work area from a disk file, the PET's own RAM or ROM or an EPROM mounted in the programmer socket. The programmer costs £125 including VAT from Davidson Richards, 14 Duffield Road, Derby.

COMPILED BASIC — A REALITY AT LAST

We are presently reviewing no less than three BASIC compilers, but they are so interesting we thought we should mention them straight away.

Most PET programs are written in BASIC. Running the program causes it to be translated line by line into machine code by the BASIC Interpreter held in ROM. This translation is done each time the program is run.

Some larger computers use a compiled BASIC which executes very much faster. This is achieved by carrying out a single translation run that compiles the program into machine code. Thereafter it is just this compiled version which is run. Compiled programs also occupy less memory space.

Oxford Computer Systems recently introduced their Integer BASIC Compiler at £150. Details from Woodstock (0993) 812838. Now Drive Technology have come up with the DTL Basic Compiler at £300. There is also a special £900 version which incorporates a protection feature they say will prevent illicit copying of compiled programs. Details from 318 Ringwood Road, Ferndown, Dorset.

It should be possible to compile almost all existing programs written in BASIC. The results cannot then be listed or altered. For a full explanation and critical reviews of all three products, see our forthcoming feature 'The Truth about BASIC Compilers'.

DON'T GO AWAY IN JUNE!

June 18th to 20th are the dates of the second great PET Computer Show, to be held at London's West Centre Hotel. More than 9,000 people flocked to last year's show at which 64 companies exhibited a wide range of peripherals and software. This year there will be twice as many exhibitors, including *PRINTOUT,* so be sure to drop by and see us.

The Show will be open to the public from 10 a.m. to 7.30 p.m. on 18th June and 9 a.m. to 3.30 p.m. on 20th. The 19th is reserved for trade only.

Commodore are expected to launch a number of new products including the 8096. There will also be a series of seminars on different aspects of PET computing.

PET ON T.V.

From the people who brought you colour for the PET comes *Monadaptor,* a black and white T.V. interface that reproduces both sound and vision from the PET on an ordinary UHF T.V. set. And if you get fed up with white on black, you can always switch to Sinclair-style black on white.

Sadektronics, who make it, tell us they have used none but the best components — including a remarkable 8MHz bandwith UHF modulator. We have not seen *Monadaptor* yet but we hear it produces extremely crisp results. Either way it sounds a lot more watchable than the television networks' latest offerings.

Details from Sadektronics at North West House, 45 West Street, Brighton.

RECEIVERS IN AT COMPUTERAMA

Bath discount dealers Computerama have gone into receivership. Whilst not official Commodore dealers, the company did offer PET equipment usually well below recommended retail prices. Messrs Thornton Baker of Refuge Assurance House, Baldwin Street, Bristol were appointed as receivers following a meeting of creditors.

SPOT THE DIFFERENCE

Notice anything odd about this PET? Yes, it is the keyboard. This is an 8K PET that originally had the calculator style keyboard. But it has been upgraded with High Fidelity Electronics' £100 replacement keyboard. It is supplied with a wiring harness and enamel mounting panel. But if you don't feel like fitting it yourself, they will do it for you. Details from 33 Canonbie Road, Honor Oak, London S.E.23.

CLERGY MEET PET

The clergy are not generally known for being in the vanguard of change — more like the guards van! All the more surprising then to see dozens of them gazing in awe at PETs at an introductory day organized by the diocese of Arundel and Brighton.

At the session, held at St. John's Seminary, Wonersh, near Guildford, the amazed clerics were able to try out word processing, database, accounts, mailing and *VisiCalc* packages on machines loaned by Scan Computers. There was some concern about the cost to a parish, but having seen the Commodore modem in action, the reaction was that this could prove a cost-cutter, perhaps linking into a central system on a deanery basis.

Our ecclesiastical correspondent reports that the entire day passed without a single space invader receiving its clerical comeuppance. It was learned, however, that the Rev. John Nuttall, founder of the Southern Users of PET Association (SUPA) and organizer of the session, is working on a Random Sermon Generator.

PET SUPERMARKET OPENS

ACT, whose Microsoft division distribute much of the PET software sold in this country, have surprised other large data processing companies by opening their own microcomputer supermarket. Located at Shenstone House, Dudley Road, Halesowen, the Computer Store stocks only PETs and ACT's own 800 system.

The layout is such that customers can walk in, browse around, and try out a program or a whole system without obligation. The full range of ACT Microsoft programs, including *VisiCalc,* is stocked, as are a wide range of computer stationery and supplies.

Another innovation is an in-store word processing bureau, handling manuals, price lists and repetitive mailing for outside customers. The company have their own network of engineers to install and maintain the systems. Full details from Chris Buckham on 021-501 2284.

DENSPET SHOCK HORROR

After wide ranging enquiries conducted in local hostelries, our investigators have uncovered the truth about DENSPET.

We can reveal that this small group of highly motivated men are in reality the international association for the exchange of original programs for the MTU 200x320 dot high resolution PET accessory. To make matters worse, they are inviting members of the MTU-using public to send either a sample of their work, £2.50 *or* $5, in order to receive a sample in return plus subscription to a newsletter and list of available programs.

In the public interest we are naming the man behind DENSPET; he is one Frank Chambers, a self-confessed computer "freak". We have established that the group are currently operating from Rock House, Ballycroy, Westport, Co. Mayo, Ireland.

At this point our investigators made their excuses and left.

Now Peddle Sues Commodore

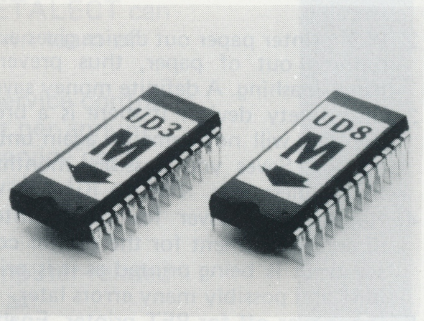
Enraged by the action of his former employers, Commodore, who are suing him for $8.5m for return of stock, Chuck Peddle, inventor of the PET has launched a counter-attack. Peddle's $52.5m 'and fifty cents - because I like to be exact' countersuit alleges fraud and willful witholding of stock due under an option scheme. The 50¢ is believed to relate to some money Peddle once lent Commodore's founder, Jack Tramiel for a telephone call.

Peddle's lawyers have demanded a large number of documents relating to the stock option scheme and the management of the company during the time he was employed. The company have so far refused to produce the papers. Depositions from more than forty former and serving officers of the company are also being sought.

Industry observers believe that the case may proceed to trial despite the potentially massive cost. 'It has become a personal battle between Tramiel and Peddle' according to a source within Commodore. Jack Tramiel shrugs this off. 'It's just business', he says, 'We have to protect the interests of shareholders.' Peddle is promised to fight 'until my money runs out.'

CHIPS FOR PETS

Machsize have been at it again. This time they have come up with a two-chip PROM set for 4032 and 8032 PETs.

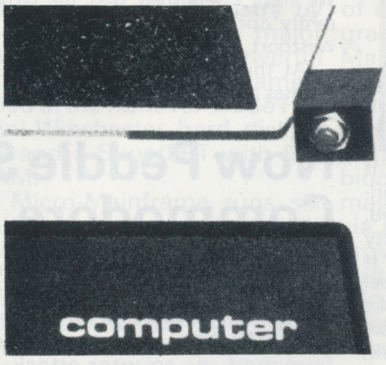


Dubbed Maxi-PROM, it gives immediate access at power-on to Universal Wedge, the disk operating system support program. One of the chips replaces the PET ROM, while the second is positioned in a free socket on the main logic board — assuming you still have one free.

A nice touch is that Maxi-PROM is automatically initialized at power on. It also provides a routine to disable the RUN/STOP key, and a repeat function on all keys. The price is £38 plus VAT and postage from Machsize Ltd., York House, Clarendon Avenue, Leamington Spa.

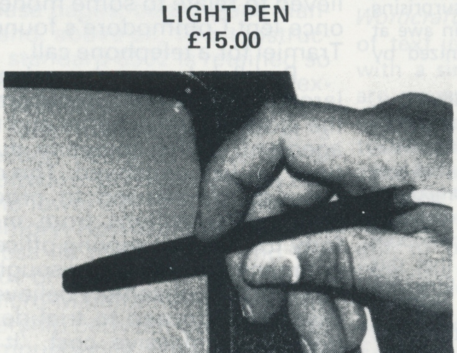
PET OWNERS

RESET BUTTON
£8.00



Recover from 'crashes' easily without losing your MACHINE CODE or BASIC program. Simple to instal. For new ROM (not upgrade) machines only. Pin connection at memory expansion connector.

LIGHT PEN
£15.00

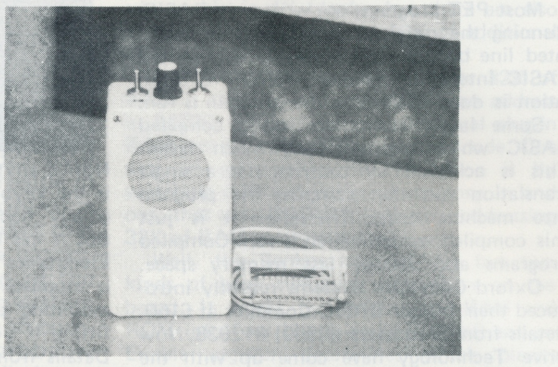


Improve your programs, use light pen input and selection. Simply plugs onto the user port. Demonstration program supplied with the unit.

NEW DEVICES FOR YOUR PET

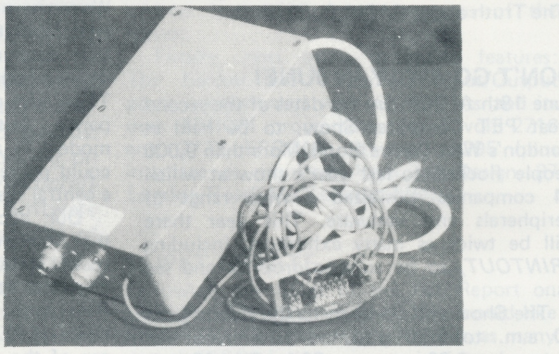
1. Replacement for error light on disk unit, thus enabling you to tell when the disk in on. LED glows green, changing to red when you get an error; also gives audible warning. £11.95
2. PET printer paper out device gives audible warning when running out of paper, thus preventing the print head from smashing. A definite money saver. £11.95
3. Disk safety device: if there is a break in mains supply the disk will not come on again until the reset button is pressed. Saves you possibly months of work. Ideal for the business user. £11.95
4. Replacement cover for PET printer. This device is a direct replacement for the printer cover, so you can now see what is being printed as it is printed, instead of four lines and possibly many errors later. £7.50
5. Paper tear off for PET printer. Enables you to tear paper at any point. Clips directly on to the tractor unit, so goodbye to expensive perforations and wasted paper. £11.95
6. ROM Expander. At £12.95 this plug in board allows two x 4K ROMs to occupy the same socket. Switch selectable.

SOUNDBOX
£15.00



On/off switch, volume control and tape cue/listen device switch. PP3/PP6 battery required. Connects to user port.

T.V./VIDEO INTERFACE
£31.50



Connect PET to a T.V. or to a Video monitor. This unit has its own fully fused power supply included - no need to use your valuable cassette connector. Three picture adjustment controls included.

We will combine interfaces onto single connectors wherever possible thus giving YOU the user more on line devices.

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WE RESERVE THE RIGHT TO ALTER THE DESIGN AND SPECIFICATION WITHOUT NOTICE.

Tel.(0385)67045

Quarty Computer Services
20 Worcester Road, Newton Hall, Durham

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The Hitchhikers Guide to the PET
Chris Preston's superb handbook of PET information omitted from the official manual. **£6.50 & 75p P&P**

Understanding Your PET
Step by step instructions from the moment you unpack your PET. An essential guide to PET BASIC with many exercises and examples. **£15 & 75p P&P**

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Commodore's new VIC

Commodore will rattle the micro-world this month with the introduction of a multi-featured, fully expandable microcomputer carrying a retail price of £179.95. The new Video Interface Computer, or VIC, offers a range of options and capabilities not found on machines in the same general price category. Right now, no one has more experience with the VIC than the distinguished educator and director of the Computertown USA project, RAMON ZAMORA, who Commodore commissioned to write the VIC manual. So we went to the horses mouth. His report:

The VIC is positioned above the Sinclair ZX-80 (£99.50), and below the Tandy Colour Computer ($399 US) and the Atari 400 ($499). Feature-for-feature, the VIC gives them all a run for the money, and in the case of the Sinclair, simply eliminates it from the competition.

Here's what the VIC has to offer:

* **Colour**
* **Full-size typewriter keyboard**
* **Full Keyboard Graphics**
* **Special Function Keys**
* **5K Memory (1.5K used for screen display); Expandable to 32K**
* **Low Priced Peripherals**
* **Sound**
* **PET BASIC**
* **Plug-in Program/Memory Cartridges**
* **Good Documentation**
* **Ports for Joysticks, Paddles and Lightpens**
* **Self-Teaching Modules**

Without delving into a lot of detail, let me say that for $100 less, the VIC provides substantial advantages over the Tandy Colour Computer in the areas of colour, sound and graphics. With respect to features, the VIC and the Atari 400 are well matched, but the VIC full-function, typewriter keyboard and the VIC price makes for an easy VIC/Atari purchase decision. Basically, the VIC is competitive with microcomputers selling at three to four times its price.

The VIC Colours

The VIC presents a screen image area that is 22 characters wide by 23 lines high. Around the central screen area is a border. The VIC's border can be any one of eight colours. The central screen area forms the "background" for whatever is displayed on the TV, and can be any one of 16 colours. Every character placed on the background can be displayed in one of eight colours, using both standard and "reverse" character images.

The VIC's border and character colours are: Black, White, Red, Cyan, Purple, Green, Blue, and Yellow. The background on the screen uses the same eight colours just mentioned plus Orange, Light Orange, Pink, Light Cyan, Light Purple, Light Green, Light Blue, and Light Yellow. Mixing and matching colours on the border, background, and the characters being displayed gives the user enormous flexibility and control of screen images. The VIC's ability to present a character in "reverse" (the background colour of the character position and the character colour are reversed) when combined with the right VIC graphics give even more control.

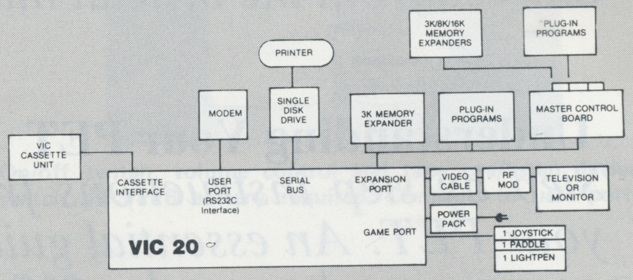
The VIC user can set the border and background easily, since a single memory location, 36879, controls the colour setting. POKEing any number from 0 to 255 into this memory cell alters the border/background display. This control feature can be used from within BASIC programs and provides the user with interesting design opportunities when constructing applications programs.

For individual colour character work, the VIC BASIC language allows a colour attribute to be assigned to single characters or strings of characters. The VIC keyboard has eight COLOUR-keys that are used to assign colour attributes to character strings. The keys are marked BLK, WHT, RED, CYN, PUR, GRN, BLU, and YEL. When a PRINT statement message is being typed, pressing the CTRL-key on the keyboard and one of the COLOUR-keys, inserts a colour attribute into the message field. All characters after that point will appear in the designated colour, until another colour attribute is encountered. This method of colour control is an elegant way to handle getting colour to every individual screen character from within BASIC, especially for beginners.

Of course, the POKE statement can also be used both to place a character on the screen and set its colour. This operation required two POKEs. One POKE is made to the memory location that handles the character to be displayed and its position on the screen, and a second POKE is made to another memory cell that records what colour is being used at the particular screen position. The two memory locations corresponding to the upper left corner of the screen are 7680 (character) and 38400 (colour).

Super Expander Card — 3K Added Memory (converts VIC to 8K)
High Resolution Graphics & Plotting Commands
Pre-assigned Function Keys
Horizontal Scrolling

Programming Aid Card — Programmer's "tool kit"
Machine Language Monitor
Pre-assigned function keys (prog commands)
User-assignable function keys



The VIC Voices

The VIC has three music voices, each with a three octave range, and one "noise" generator. Sound varying from Bach to Zzaps can be constructed using these tone generators.

The total range of the three music voices is about seven octaves because of overlaps. Even so, the effective range is only about five octaves since the fidelity at the lower and higher ends of the scale are not that pleasing to the ear.

The voices and "noise" generator are at memory locations 36874 through 36877. POKEing values of 128 through 254 into these locations activates the sounds. Values below 128 turn off the voices. The volume control for all voices is at 36878. POKEing a zero into this location is like turning off the volume. POKEing a 15 into 36878 sets the volume to LOUD.

Commodore chose as the heart of the VIC the upgraded 6502A microprocessor chip. The 6502A is fast. Using the BASIC language GET function to scan keystrokes off the keyboard, the VIC can be made to act like a music keyboard. The response time from keystroke to sound generation is nearly instantaneous. Children are delighted by simple "Colour Organ" programs, constructed in BASIC, that let them play notes while the background/border colours flash in syncopation.

Accessories, Peripherals, and Paraphernalia

For a computer costing less than £200, what can reasonably be expected in terms of accessories and peripheral connections? Everything! Again, the VIC is designed to be fully expandable. The list of possible devices, gadgets, components, parts and pieces seems to go on forever. Here is a list of what Commodore either already offers or plans to offer within the next few months:

* *Tape Cassette (You can use the one from your PET/CBM)*
* *Dot Matrix Printer (under $500 US)*
* *Master Control Panel (fits into cartridge slot)*
* *8K and 16K Memory Cartridges*
* *RS232C Interface Cartridge*
* *SuperExpander (high resolution graphics, music, 3K memory*
* *Self-teaching materials from the Commodore Learning Series (books & cartridges)*
* *Disk Drive*
* *3K Memory Expander*
* *Joysticks, Lightpens, paddles*
* *Game Controllers*
* *Telephone Modem*
* *Plug-in Program Cartridges*
* *Software Development Tools and Assistance*

It is clear that every VIC component is being designed to be price and performance competitive in the marketplace. The dot matrix printer, scheduled to cost under $500 (US), produces high quality, upper-lower case copy, including the VIC's graphics characters.

The most interesting item in the list is the Software

The VIC Keyboard: A Guided Tour

Not long ago, you would have paid as much for a keyboard of the VIC's quality and flexibility as you now pay for the VIC itself. Most VIC keys are multi-functional and produce as many as four different characters. For example, any key with an alphabetic letter can be made to display the upper and lower case letter shown on the keytop plus the two graphics symbols that appear on the face of the key. Here is a brief tour of the VIC keys.

SHIFT *keys — Just like a typewriter, the VIC has two shift keys and a shift-lock key.*

CLR—HOME *— Used to CLeaR the screen and "home" the cursor. This key works as it does on PET/CBMs.*

CRSR *keys — Used to move the cursor around the screen. The keys have a "repeat" feature that keeps the cursor moving until you release the key.*

RETURN *key — Works like the carriage return key on a typewriter and is used to signal the end-of-line when you are typing.*

CTRL *key — This key is used with the COLOUR keys to select the colours you wish to display. The key can be used in combination with other keys to build up "control" commands in applications you might create.*

COLOUR *keys — The first eight number keys are also the colour keys. When you hold down the CTRL key and press one of these keys, the cursor changes to the colour selected. Everything typed after that is in the new colour. Pressing these keys while creating messages or strings of characters for a program causes a colour attribute to be inserted into the character string. When the string is PRINTed, the characters appear in the designated colours.*

RVS ON *and* **RVS OFF** *keys — To use these keys, you must hold down the CTRL key and then press the key you want. Pressing RVS ON, "reverses" the images that appear on the screen. Pressing RVS OFF, tells the VIC to display "normal" images. When you turn on the VIC, images are displayed in dark blue on the white background. If RVS ON is pressed, the images appear as white characters on a blue background or in "reverse" form.*

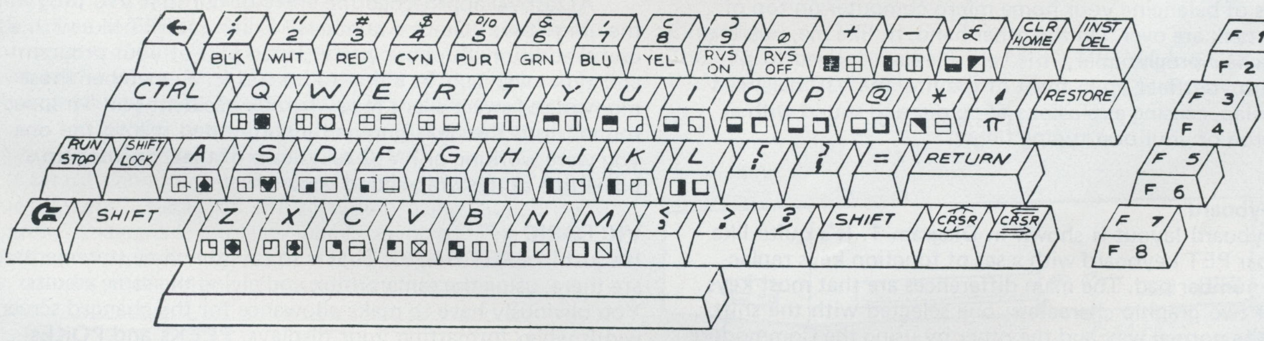
RUN—STOP *key — Pressing this key tells the VIC to stop whatever it is doing. As on the PET/CBM, holding the SHIFT key and pressing this key activates the cassette tape loading sequences.*

INST—DEL *key — Used to INSerT and DELete characters on a line. This key works like the similar PET/CBM key.*

GRAPHICS *key — On the face of all the keys with letters, as well as a few other keys, appear two graphics characters. To display the characters on the left, you hold down the COMMODORE key (the key with the Commodore symbol on its top) and press the key with the graphic you want. To get the right-hand characters, hold down the SHIFT key and press the key with the graphics symbol. When you turn on the VIC, the computer is automatically placed in this "graphics" mode where you can type upper case letters and the left- and right-hand graphics symbols.*

UPPER/LOWER CASE *and* **GRAPHICS** *keys — Pressing the SHIFT and the COMMODORE keys at the same time, puts the VIC into a "text" mode. In this mode, the VIC acts like an ordinary typewriter, with full upper and lower case letters. In addition, all the graphics symbols on the left-hand side of the keyfaces can be accessed as before, using the COMMODORE key. The graphics in the "text" mode are ideal for most business applications and can be used to create forms, charts, and graphs. To return to the "graphics" mode, press the COMMODORE and SHIFT keys simultaneously once again.*

FUNCTION *keys — The four keys on the right side of the keyboard are program assignable. From within applications you create, you can assign tasks to be performed that are activated by the pressing of these keys.*



Development Cartridge. Commodore are out to solve the software crisis by giving *everyone* an opportunity to become a software creator.....on the VIC. The cartridge is rumoured to contain extra memory, a machine language monitor, and "toolkit" of software development routines. Applications can be developed on the VIC using BASIC and machine language routines. The final program can be SAVEd onto a tape cassette that can then be used as input to the process of creating a ROM cartridge.

Clever, and cost effective! As a backup, the VIC people are also exploring ways to use the PET/CBMs as development systems for VIC software. One thing you can bet on: a low-cost software development environment is going to be available for the VIC.

VIC in the Future

Where is the VIC likely to end up? Will it find its way into homes? Or schools? Or businesses? The answer is, yes! The VIC is probably headed into a variety of end user situations.

For the schoolroom, the VIC is ideal in many ways. The cost is low. The VIC can be connected to any colour TV set. The range of colour, sound and graphics features encourages children to spend hours in exploration, and formal learning materials can be presented in interesting and innovative modes. The Commodore Learning Series modules provide ideal tools for teaching children and adults about computing. The VIC screen format appears to be ideal for developing learning materials for small children.

Businesses and businesspeople will find many ways to use the VIC. The VIC is expandable to larger memory sizes, accommodates a wide range of peripherals (including telecommunications equipment), and is small enough to be moved to points of need within office areas. As specific software products emerge (word processing, financial packages, languages), the user base in the business and scientific areas will expand.

The early PET machines have been used in a variety of process control environments. The VIC offers the same or greater capability (the processor is faster), at a lower cost. With both RS232 and IEEE interface capacity, the VIC is an interesting £179 control computer alternative.

Obviously, this list of features and uses could be continued almost indefinitely. Yes, the VIC will run programs in PET BASIC (allowing for screen size and memory differences). Yes, the VIC keyboard is a "real" keyboard. Yes, the price is "really" under £200, and that's all you need to get started.

If it is not already apparent, the VIC is one of the lowest priced, fully functional microcomputers being offered today. From its inception, the VIC has enjoyed a breadth and depth of support from its manufacturer that has been unusual in the industry. Product design, support, expandability, and the phrase "user friendly" seem to have been its creators' watchwords. In addition, Commodore reached out into the development and user community for feedback and assistance early in the creation cycle. The result: a truly outstanding personal computer.

One of the first European's to get his hands on a VIC was Commodore's U.K.'s aimiable Software Manager, MIKE GROSS—NIKLAUS. We commissioned him to report on

MAY
4
MAY
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1

My first four days with VIC

The VIC came as a bit of a surprise to all of us. We'd read the preliminary specifications and concluded that it had more facilities than the PET. I suppose we should have realised that in these days of micro technology, every new arrival packs more goodies into ever less space! Instead of the usual two foot cube of cardboard, I was handed a keyboard in a very light weight, nicely styled PET-White plastic case. "Where's the rest of it?" I asked. "That's it!" was the reply; "It'll go in your brief case if you want!"

And, my goodness, that really *is* it! A PET-like micro computer with 16 colour screen, three independent melody voices and an effects synthesiser, serial and RS232 output, IEEE 488 capability, PET BASIC 2, full PET graphics, programmable character fonts allowing high-resolution displays, programmable function keys, connectors for joysticks and a light pen, plus the ability to load and run cassette programs saved on a PET cassette unit, all wrapped up in a neat little package you can balance on one finger.

But don't get jealous, all you PET owners. By the time you've connected the power pack (supplied with every VIC but different for the various mains supply standards around the world), your television set and the cassette unit, (yes, you can use your PET cassette drive), you will discover that the days of balancing your home micro computer on top of the fish tank are over. On the other hand, if, like me, you are an arm-chair programmer, it is very pleasant indeed to sit back with your feet up in front of the fire, the VIC balanced on your lap, causing explosions of colour and sound with a single prod of your best typing finger.

The Keyboard

The keyboard layout is shown in Diagram 1. It's quite like the Super PET keyboard with a set of function keys replacing the number pad. The main differences are that most keys support two graphic characters, one selected with the shift key in the normal way and the other by using the Commodore logo key. The colour and reverse control characters under the digits on the top row are selected with the CTRL (Control) key. If you press RESTORE and STOP together, the VIC does a reset with a 'warm start', leaving your program hopefully unscathed in memory but resetting everything else. The keys themselves are the same distance apart as on the Super PET, most of them chocolate coloured with the function keys in an orangy-yellow. They have a nice feel to them and I predict a lot of VIC owners will use it to "Teach Themselves Typing". And hurray! cursor movement, insert, delete and space keys all repeat just like the Super PET.

The Screen and Screen Editor

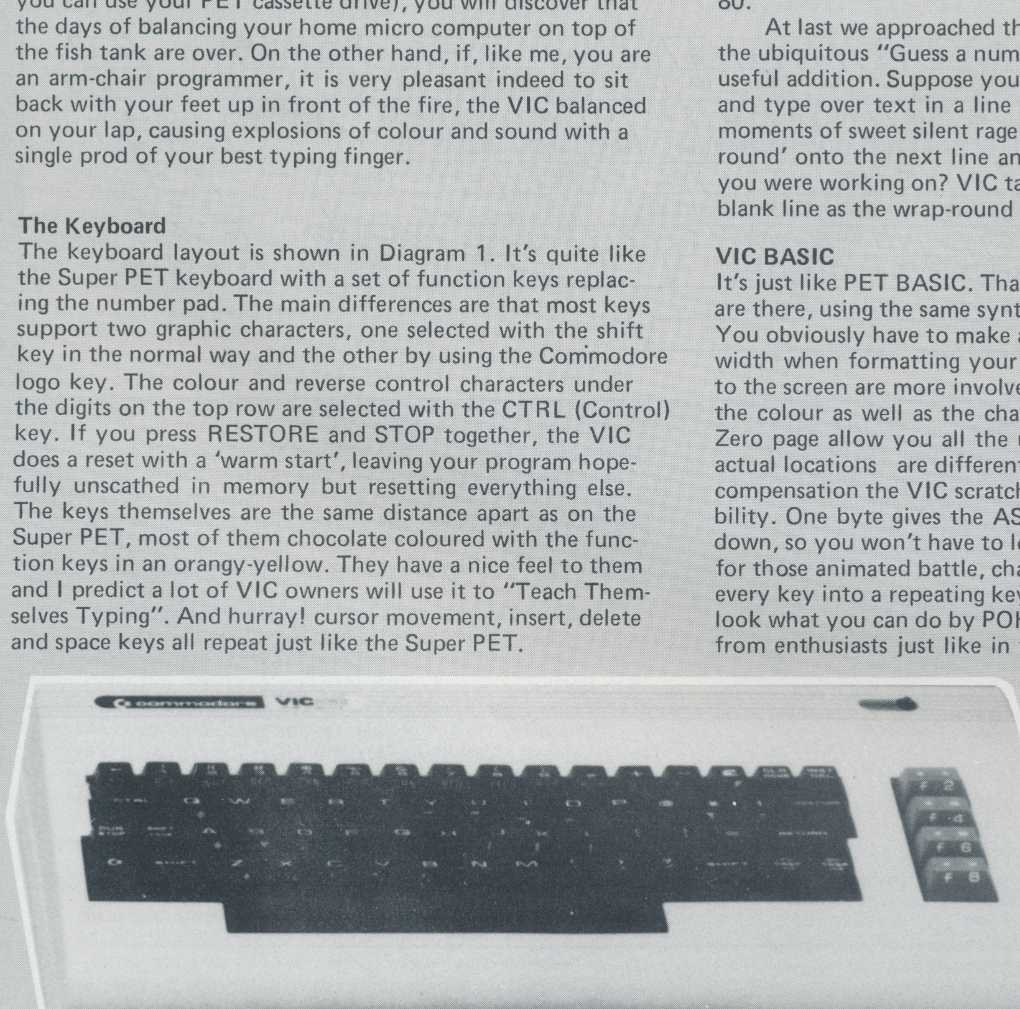
We connected the VIC up to a suitable colour monitor (the production version will connect to the aerial socket on your black and white or colour T.V.), turned on the monitor and then the VIC. Having worked with PETs for so long, we'd put the screen up close to the keyboard, so when the screen lit up in a blinding white with blue (Cyan) lettering and border, it came as a bit of a shock. With the average domestic T.V., you will probably want to leave it where it is and work from a chair or table nearby, but small screens, say 9 to 12 inch diagonals should give a superb close up picture.

The biggest worry we'd had in looking at the specs was the number of characters that the VIC displays on each screen line, which is 22. Obviously 40 characters per line gives you more scope and 80 characters even more so, but we were surprised by just how quickly we got used to listings displayed with BASIC lines spread over up to four screen lines instead of two. There are some unexpected bonuses. Using an average T.V. set, you can read text on the screen up to twenty feet away or more, which sounds promising for some applications in education, for example. Also each BASIC line stored in memory can contain up to 88 characters as opposed to PETs 80.

At last we approached the entry of our first VIC program, the ubiquitous "Guess a number!" Editing is PET-like with a useful addition. Suppose you've listed part of your program and type over text in a line to amend it. Remember those moments of sweet silent rage when by accident you 'wrapped round' onto the next line and incorporated it into the one you were working on? VIC takes care of that, opening up a blank line as the wrap-round occurs.

VIC BASIC

It's just like PET BASIC. That is to say, the same statements are there, using the same syntax and giving the same results. You obviously have to make allowance for the changed screen width when formatting your displays. PEEKs and POKEs to the screen are more involved because you have to POKE the colour as well as the character. PEEKs and POKEs to Zero page allow you all the usual tricks, but I'm afraid the actual locations are different from PET and Super PET. As compensation the VIC scratchpad gives you some extra capability. One byte gives the ASCII value of the key currently down, so you won't have to look up keyboard matrix values for those animated battle, chase 'n race games. Another turns every key into a repeating key. I predict a spate of "Gee Whiz, look what you can do by POKEing this with that" snippets from enthusiasts just like in the early years of PET, those



COMMODORE'S NEW VIC AT £179 THE TRADE SAY IT WILL BE A BEST SELLER happy, happy days, when there was so much to find out that every one was an expert. Judging by the drafts I've seen of the VIC reference documentation, we will be much better informed from the start, so the learning curve will be much steeper and shorter.

Colour on the VIC

The range of control characters of the PET-like "CLEAR SCREEN" and "REVERSE ON" has been extended in the VIC to include the eight main colours and the eight function keys. To program colour for text and graphics, you use the colour control keys in much the same way as Reverse On"; that is to say, open quotes, hold down the CTRL key, press the appropriate colour key on the top row". And just like the "Clear Screen" and other control keys of the PET, the VIC lends graphic characters (like the reverse heart for clear screen) for the colours and function keys. At first I thought I'd never learn to read these extra symbols in a program listing, but within a few hours of starting colour programming, I was translating the symbols back into colours without a thought.

In a sense, the VIC has more computing power than the PET because the Video Interface Chip (from which the name VIC comes) is itself a micro-processor dedicated to colour video and sound. Among its 16 addressable registers is one which defines the background colour (behind the text), and the border, (around the display area). You have to POKE this register with a composite value, four bits defining the sixteen background colours and three bits the eight border colours. The remaining bit allows you to reverse the colours of text and background, instantly. With a series of POKEs to this register, you can rapidly flash screen, border and text through 256 colour combinations and their reverse images, a mind-boggling sight. You can POKE other video registers to alter the origin, width and height of the screen. Paul Higginbottom had a picture of a landscape swing about left and right, up and down, disappearing half off the television tube. It was rather what I imagine a Concorde pilot might see in an uncontrollable spin! I suspect that if he added green background, red border and purple graphics, he would have the makings of an "Aversion Therapy" routine.

I set up a children's learning game which I called "Arithmetic Squares", based on the television game "Celebrity Squares". Diagram 2 explains what's involved. The child choses a problem and answers it. Three correct answers in a row, column or diagonal of the grid wins the game.

A 9 x 7 = ?	B 4 + 6 = ?	C 8 − 3 = ?
D 9 − 5 = ?	E 4 x 6 = ?	F 7 + 9 = ?
G 5 + 0 = ?	H 7 − 3 = ?	I 8 x 5 = ?

DIAGRAM 2: ARITHMETIC SQUARES

The 'windows' of the grid are created by a common subroutine which draws one window, using variable R and C to determine where the top left hand corner of the window shall appear on the screen. So far no different from the PET. But also passed to that subroutine is CL$, which is set up with the appropriate control character for one of the eight main colours. Thus the same subroutine was used to draw the windows in blue at the start of the game, and overwrite them in Gold (Yellow) for a right answer and Red for a wrong answer.

I also used colour control to flash the chosen problem in White and Red alternately and to display messages with a moving spectrum of colour behind the text. When the child wins a game, a suitable pleasing sequence of total colour is flashed onto the screen by POKEing the colour control register as described above.

Programmable Characters

While I was playing about at this elementary level, Paul Higginbottom was investigating the programmable character fonts. He soon concocted a little BASIC routine which allowed you to replace any character by a design of your choice. It was rewarding to get my monogram "GN" displayed in one character space every time an M should have appeared on the screen. On a less egotistic note, we drew circuit diagrams with diodes, resistors and capacitors as single characters, special maths symbols and so on.

As the real show stopper, Paul designed a series of views of an army tank, head on, three-quarters view, sideways on and so on. With a simple little BASIC routine Paul had this one character tank trundle across the screen then slowly turn with uncanny realism and trundle back again. Who wants to spend 20 pence a go on arcade games when you can design them yourself to this sort of standard?

Machine Code Programming

There is no monitor built into the VIC; it comes as part of one of the add-on ROM packs. What you can do, however, is use the PET and its assembler to create machine code programs. Save them onto tape using the PET monitor and cassette drive, then load the same routines into the VIC. Paul did this to create a VIEW program to display an interrupt driven dynamic representation of the VIC's zero page on the screen so that we could check out byte usage.

Expansion

The expansion slot at the back of the VIC takes ROM and RAM packs direct. You just slot them in. The ROM packs can be set up to run as soon as the VIC is turned on. I can just imagine: "Now children, turn on your VICs. You will see on the screen a picture of a flower. Watch it grow......" I have seen preliminary versions of a high resolution graphics package and a programmer's aid pack and many more are planned in utility, learning, applications and games series. With an extension board you can add ROM and RAM memory to practically the same capacity as the biggest PET. I have also seen the VIC linked to the 'Source', a database accessed by telephone line.

VIC REAR VIEW

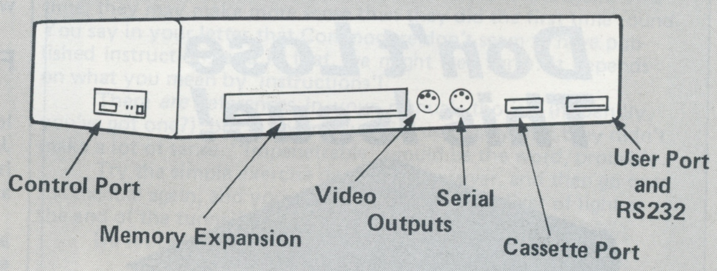


DIAGRAM 3

Conclusion

We set our VIC evaluation team up in the lounge of a private house because when it was on Commodre premises, so much interest was shown by staff of every age that we had great difficulty in achieving an uninterrupted half-hour of serious work. We don't have that problem with PETs. The colour and sound of the video chip together with the programmability borrowed from the PET make the VIC a most attractive proposition that melts the hearts of even our most hardened managers.

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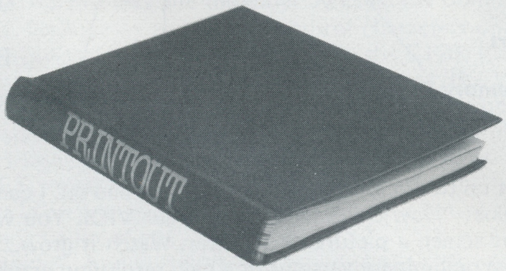

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The Price of their Toys separates Men from Boys!

We plan to start a new feature in *PRINTOUT* – in fact, it's really starting right here, in my pages, as of now. Be warned, it's not a lot to do with computers generally, let alone PET specifically, which may empurple a few faces.

We hope not though, and if our guess at your psychology is right, the new feature may turn out to be quite popular. We're not sure what to call it, as and when it acquires a life of its own, with half a page (or even a full one) to go with it, but "Chips With Everything" is the current favourite around the office.

You see (not that you'll need us to tell you), the chip is becoming all-pervasive, and that's not, thank Heavens, only in boring old things like food mixers, sewing machines and clothes washers. Nope – the chip's revolutionised what the merchandising men are pleased to label, as a sweeping generality, "the leisure market".

By which they mean that great spread of goodies we guiltily eye, sneakily buy, and from which we carefully remove the price tag before showing our wives. Those things which aren't really necessary, but do make life more fun and/or easy.

Like pocket biorhythm calculators; super-sophisticated TV games; hand-held computers; alarm clocks that *speak* when it's time to get up; radio receivers that scan for signals over more than 32,000 frequencies; little black boxes to fit in your car that give a second-by-second reading of petrol consumption; and many more, either here today, arriving tomorrow, or about to be announced next week.

We *could* (as, indeed, we more or less *have*) carry on ignoring all these exciting but peripheral goings-on. But a number of spot checks we've carried out have suggested pretty strongly that many people with an interest in, or possession of, a microcomputer also have a fairly pronounced leaning towards the other type of thing we've mentioned.

So what more sensible than to use a small piece of *PRINTOUT* to keep you up-to-date; to tell you what we've seen and like; to warn you about others that didn't look so good or behave so well; and generally to gather in all the weeny microprocessors (because that's what they are) that exist all round us.

Fiendish Oriental Fun...

And let me start with an item with which I have an on-going love-hate relationship. Already mentioned above, it's my talking Japanese alarm clock, and a more infuriating fun device it'd be hard to imagine. To own one will cost you £39 or thereabouts, and your life will never be the same.

It's about one-and-a-half times the size of a pack of cigarettes, and probably more dangerous. The time display is, as you might expect, liquid crystal and lies along one side.

The whole of the top is given over to the loudspeaker which talks you to wakefulness in the morning. Three times. At five minute intervals. In increasingly more exasperated terms and tones. With a Japanese accent. And a merry little tune. Until you feel like giving it a smart karate-style chop, and the heck with your £39 investment.

The alarm function begins by announcing (if, for instance, you've set it for 7.30 am) that "The time is now 7.30 am" and then launches itself into some obscure but totally penetrating minuet.

If you survive that, the onslaught starts again five minutes later, with a slightly more testy voice telling you "The time is *now* 7.35 am. Please hurry" and a repetition of the tune.

Get through that, and you'll be clobbered after a similarly short period with a really annoyed statement to the effect that yet another 5 minutes have gone by, and by gosh, you'd better get a move on. And to make sure, the damn thing plays that blasted tune *again!*

Mind you, it's clever, very clever. Fiendishly Oriental, in fact. Because it does a lot more than simply torture you in the mornings. It's also a stop-watch and a count-down timer, all complete with announcements at various periods you can choose.

You want to have a stop-watch which will tell you at ten second intervals how much time has 'erapsed'? (That's its pronunciation; it's not my spelling). It'll do it. Or tell you every 30 seconds, or every minute – it's up to you.

And, for good measure, whenever you press a button on the top, it tells you with Eastern accuracy, how much time has gone by at that instant.

The same sort of functions exist for the count-down timer, with the same voice but different words, and you also have a choice of what you'd like the thing to do if it's simply acting as a normal clock. It'll either keep coyly quiet as tempus fugits, or it'll play chimes on the half-hour, and actually announce the time, plus a three-gong time signal, on the hour.

Now I know I've described it in a fun way, but honestly, when you think for just a moment of the technology that's gone into its construction, and especially its voice synthesis chip, it's a little mind-boggling.

Or at least it should be. But perhaps it's a measure of just how hardened we're all getting to technology's relentless advance that our initial astonishment lasts only an hour or two, and then decreases to a matter-of-fact dependence on the box as bought.

As a yardstick measurement, on the other hand, just think of what our Victorian grandmama's reaction would have been to this little silver box, within the life-time of many people you know who are alive today.

Anyway, *PRINTOUT's* new "Chips With Everything" feature will at least make sure that you're aware of what's new in the microchip market. And that's something on which we think you'd like to be kept abreast.

It's Geere Again!

Elsewhere in my column I have covered electronic goodies but not the miniature camera I used to snap this pic of RON GEERE as he bore down on me. Note the knees......

IT *CAN* BE A PROBLEM!

You know, our postbag here is endlessly interesting and often brings all of us (because we tend to share the letters round in the editorial office) up with a jerk. The most common effect is to make us realise how easy it is to get subjective to computers generally, PET particularly, and its workings especially.

Take, for instance, a recent letter from Barry Gilpin of Owler Lane in Oldham. Barry wrote to say he had a new-ROM 8K PET which, he understood, had a built-in monitor that would let him load, run and save machine-code programs.

But, Barry said, what *was* this monitor and how did he use it? He was coming across various interesting machine-code listings in magazines and so forth, but wasn't at all sure what to do about them.

Now I'm not madly machine-code orientated myself, but I *do* know about and use the monitor, and tend to forget the days when it was a murky mystery. It thus provides a healthy and salutory jolt to get a letter like Barry's.

First, type SYS1024 on a blank screen. Don't worry about what happens, though it *will* look a little odd. Just locate the friendly old cursor, which should still be winking prettily alongside a colon.

Type an M, then a space, then 0400, then another space, then 0500. Don't forget the leading zeroes in the 0400 and the 0500. When you've done that, press RETURN.

What you'll then get (or should, if you've done what Uncle Gavin told you!) is a list of numbers down the left-hand side of the screen, from 0400 to 0500. They'll not be a simple ascending numeric list. In fact, they'll be hexadecimal, but you've no need to worry about that at all.

Alongside each number will be a row of 8 pairs of digits, or letters, or a mixture of both. Again, don't worry about what's there (though, if you had no program in memory when you began, they'll most likely all be "AA").

Right, you're now looking into the heart of PET's memory, where the programs live when they're in residence. The nice thing is that you can modify anything that's there, or put things in, by moving the cursor to whichever pair you want to change, and overtyping. A carriage return then enters your new material into memory in place of whatever was there in the first place.

So how do you go about entering machine code programs you see listed in magazines? Well, first of all make sure they were intended for PET. If they weren't, though they'll look like the things you see when you look at PET's monitor, entering them won't do much for your composure when you try to run them.

Assuming the listing was for PET though, check the four-digit numbers it begins and ends at. These are the numbers you enter after the "M", when you've typed SYS1024. After that, you should be able to go right ahead and, by over-typing, enter the magazine listing. When you've finished, type an X and RETURN to get out of the monitor and back into friendly old BASIC.

Hopefully, the magazine from which you got the listing will also have told you how to make it run. Normally it will be by typing a different SYS number, which sends PET to the listing you entered to start running it.

The only other thing you'll want to know, in this very low-key machine-code primer, is how to save the results of your efforts. It's simple enough. After you've finished entering the machine-code, **don't** run it. There's a high chance you'll have made a small error somewhere, and running the result will almost always cause a dreadful crash!

Instead, before you exit back to Basic, type an "S", then a space, then the name you want to give the program (with the usual quotes at beginning and end), then a comma, then 01, then a comma, then the four digit number of the line you started at followed by a comma and the number of the line you finished at. Now press RETURN.

This will produce the instruction to "Press Record and Play", meaning PET's all ready to save your program on a tape cassette. Go right ahead and do it, so all your hard work is preserved.

The nice thing is that the program is saved in machine code and when you reload it, the machine code is put back into memory at exactly the same place you started.

After *that,* you can try running your program. If it crashes, never mind — simply load the program in the normal way, and it'll go straight back into the memory location it was in before. Then you can have a look to see what you did wrong, and correct it by the over-typing trick.

If you try all this, and it works (which I sincerely hope for!), go back to your PET manual and read the relevant bits again. This time, they may make more sense than they did the first time round. You say in your letter that Commodore don't seem to have published instructions and in that, we might well agree. It depends on what you mean by 'instructions'!

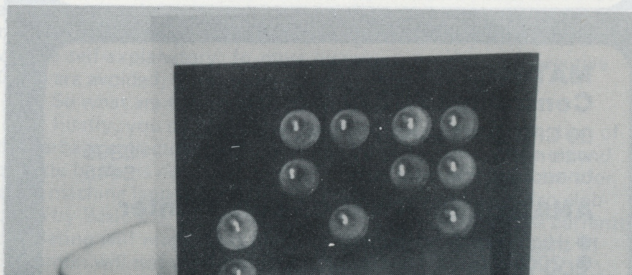
There *are* references in your manual, though (hopefully, you've got one?), but it doesn't surprise us greatly that they didn't make a lot of sense. "Impenetrable" would be the word, probably.

Try the simple exercise described, however, and then go over the manual again, and you may well find a small sliver of light at the end of the tunnel!

Do let us know how you get on.

FOR THE MAN WHO HAS EVERYTHING

Finally, here's a useful gift, even if it should probably come with a tin of headache pills. Would you believe a binary clock?



It's imported from the USA by a firm called Tamsys, who are based in Windsor, and it'll set you back £52 to be the first one on the block with a clock no one else can tell the time from.

The time on the clock in the picture is 12.35 and 37 seconds. Now work out why!

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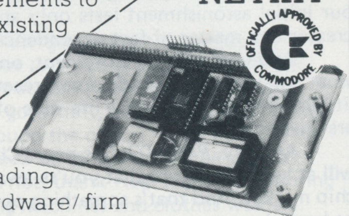

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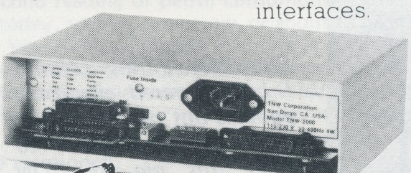

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This is an extremely powerful piece of software that many users will find difficult to resist, particularly if they own a 4040 disk unit, but do not have Basic 4.0. There are likely to be quite a number of people in this category as many pieces of software run on Basic 2.0 only.

The 4K chip adds a total of 25 new commands to BASIC. Fifteen of these are software-compatible disk commands, which give all the user-friendly disk instructions of Basic 4.0, without your having the expense of the upgrade ROM set, (which costs almost as much as *Disk-O-Pro* anyway). These include the Relative Record system, (provided that you have DOS 2.1 in your disk unit), DIRECTORY, and APPEND for sequential files. The remainder, what Skyles call Value-Added-Commands, do indeed increase the ease of use of the computer. The value of the package is greatly enhanced by the fact that Gregory Yob wrote the extremely detailed and helpful manual. *PRINTOUT* readers will need no introduction to his style of writing, and will be pleased to know that he has taken the opportunity to string together some very helpful details on how the disk system works, and goes a long way to help the reader to take the fullest advantage of the facilities in *Disk-O-Pro,* whilst at the same time, very frankly indicating its hazards and peculiarities.

If you have Toolkit installed, it will be activated when *Disk-O-Pro* is enabled, and the two are entirely compatible, except for the fact that you must remember that the AUTO command has become NUMBER, and that if you do not set the start and increment, the computer gives the message "OUT OF DATA ERROR". (This information is given in one of Greg Yob's helpful asides about "Gotchas".) Perhaps the most revolutionary command is the SCROLL feature, which enables you to move a program file up and down as if it were a word processing text file. The ability to examine any part of the program during editing is an enormous time saver, and is very likely to reduce or eliminate the need for listing programs on a printer, whilst debugging. The screen acts as a window through which you can examine any 25 lines of program at will.

You can turn a repeat facility on and off, and set the duration and tone of the beeper, for CB2 sound, in a very simple way. The manual even gives a diagram for the circuit and structure of a suitable soundbox!

Carnivorous Cursor

The Run/Stop key now has two attractive new capabilities: Shifted it provides a "Load and run the first program on Drive 0 of the Disk unit" command. Unshifted, it "eats" all characters to the right of the cursor. This speeds up editing quite considerably.

PRINT USING is available, enabling formatted output of strings and numbers, with ease. Numbers are right justified, and strings are left justified, with decimal points aligned, and commas (for thousands), inserted if required. The numbers are always rounded off correctly, not merely truncated. Literals can be included, but if you want to place the £ sign just in front of the amount, you cannot, since PRINT USING will line all the signs up vertically. Nor can you add a semi colon at the end of a PRINT USING line, so as to tabulate across a large sheet, by means of a series of PRINT USING statements. At last the owners of printers which do not automatically produce line feeds, gain an advantage! Also, if your printer prints a "#" sign when "#" is sent to it, you will need to specify "#" as a string variable in order to make it part of the formatted string, since it cannot be included in the PRINT USING statement as a literal.

One of the most useful of the facilities is the SET function. The description of what it does belies its power. The fact is that the possible uses of this key are really limited only by the imagination of the user. SET allows you to set the key chosen, (in default of your specifying one, Run/Stop is set) as printing any 80 characters on the screen. In fact more than this is possible, since the characters may include shifted ones so that two characters will be sufficient for BASIC keywords. The same is true of the new commands inherent in *Disk-O-Pro* itself. If you are feeling really ambitious, some shifted graphics can be used. Since a carriage return may also be programmed, it follows that you can write a small program, to be executed by hitting a single key!

If you chose to, you can have a GOSUB as your single key command, thus activating a section of your existing program, e.g. to print out variables when debugging.

Scroll and Set

One use which immediately came to mind was to set the Scroll function running and, upon calling up the Directory, to move the cursor very rapidly to the line showing the desired program; a Set key (probably "Up Arrow" for the convenience of users of "the Wedge") can then be used to overwrite the information as to the number of blocks with the abbreviation for Execute (i.e. Load and Run), the cursor moved 18 spaces to the right, and a colon printed, followed by a Carriage Return. This causes the selected program to load and run immediately!

Another use of Scroll is to move a directory up and down into view. This would be most useful if you have a lot of programs on a disk. To do this you merely need to renumber the directory, having loaded it as a program. One might even chose to make this directory the first file on each disk, adding a few lines at the beginning to activate *Disc-O-Pro.* Set the command concerned, list the first 20 lines of the directory, and finally implement the Scroll command.

You might find typing frequently-used Set commands inconvenient. However, there is a simple way to avoid it, again using Scroll. All one needs to do is place a number of Set instructions as consecutive subroutines in a block at the end of any program, using the Merge facility, or by installing this at the end of the program under development. A direct GOSUB to the line concerned will give you the key set as you want. This could be particularly useful if you needed to cram an overlong set of instructions into the 80 characters, since the abbreviations are not the easiest things to read, whereas a program listing will show overlength lines in full. The use of these abbreviations will be particularly helpful if the Toolkit is installed, since the Soft key is then shortened to a maximum of 60 key strokes. It is a pity that there is no way of calling *Disk-O-Pro* without Toolkit.

The manual suggests three Soft key definitions to get you started, but adds that setting up good ones is a minor art. One can visualise the User groups going into this in a big way!

SEND

SEND is a very useful function, since it will send commands to any device, and thus enables one to send to a variety of disk units, of different device numbers, or to a printer, Escape codes being one example. It has the attractive characteristic of continuing to address a unit until you specify a different device, so that you are spared the inconvenience of constantly having to include a device number, in your commands. This feature, together with the fact that both drives are scanned for a number of commands, and the automatic printing of disk error messages, when errors are encountered, is particularly helpful.

The MERGE command enables programs to be added at the end of the existing program in RAM, and overlays to be accomplished conveniently; provided the manual is carefully followed, the variables will not be lost when the new section of program is overlaid. An improvement would be the inclusion of a full interleaving merge, rather than the APPEND function provided. However, with little discipline in calling the subroutines in the appropriate sequence, and judicious renumbering, a satisfactory outcome can be achieved.

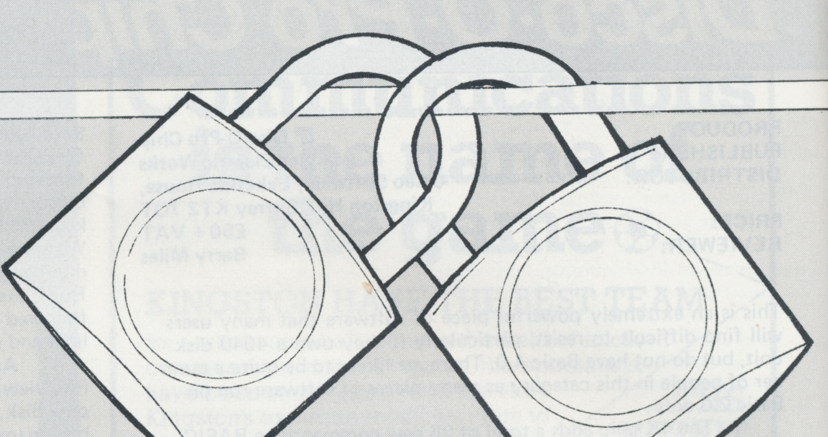
Jim Butterfield has noted that the fact that *Disk-O-Pro* checks status on every disk operation is potentially a factor for slowing down program running speed, and indeed the manual makes the point that a time penalty *will* be incurred by use of *Disk-O-Pro* when programs are running. However, you can kill *Disk-O-Pro* at any time when it is not required, and if you put the suffix ".d" at the end of any program name requiring *Disk-O-Pro,* your directories will be self-explanatory. In most instances, provided consecutive GETs are avoided, the slowing down will not be noticeable.

So what are the negative features?

Firstly, you do not enjoy the advantage of the elimination of the garbage collection problem which Basic 4.0 offers. The second cassette buffer is no longer available as the most popular haven for small machine language programs. However, since this is also clobbered by Basic 4.0, we can expect that most such programs currently circulating will reappear differently located. Certain versions of Extramon will not work, nor the "Wedge", nor "Universal DOS". However, once the new commands are learnt, users should find them more attractive. They will also be able to operate Basic 4.0 machines if encountered.

Conclusion

All in all, this package renders the PET more user-friendly, and some aspects of programming easier. The tutorial style of the manual makes learning about the product a pleasure, and should cause a large number of owners to dig into their pockets. Good value for money. Recommended.



Protecting Against Program Piracy

A report on the current state of the art in software protection by RICHARD PAWSON

A senior British Post Office Official recently confided to me that ever since the widely publicised activities of the "phone freaks", it had been felt necessary to employ a full time team of engineers, whose sole task was to discover methods of making telephone calls without payment. So sophisticated had the techniques of the "phone freaks" become, that only by mimicing their talents could they be stopped.

That situation parallels almost exactly the problems facing software authors today; that of widespread illicit copying of their programs. Not for nothing has it been described as the perfect crime, since it is one that the law neither recognizes nor understands. As a result the authors have begun to look to other means of protecting their programs. It is these methods that we shall be examining here.

Swap Shop

But why the need for protection? Originally the problem was confined to the "swapping" of relatively simple programs between enthusiasts. As the applications of microcomputers became more sophisticated, there came a concern that clients with more than one system were using a package on more than one machine simultaneously, having paid only for a single copy. Yet the loss in revenue from these two occurences is dwarfed by the magnitude of the third – wholesale copying and reselling by computer distributors and other smaller operators. Having spent some time studying the markets throughout Europe, my regretful conclusion is that it is not just the unauthorised dealers who are responsible, but in some cases respectable, highly-professional computer shops, who are often software producers in their own right. The next time you buy a tape or disk, check that it has the original suppliers packaging. If not, ask why not!

There is another aspect to all this and it concerns the dangers that arise when other programmers adapt the code, or use existing subroutines to create new packages. This practice was more prevalent when PET software was still in its infancy, applications unsophisticated, and it was possible to write or rewrite a so-called "Business Program" in less than three man-days! Cassettes were the only available medium then – laborious and notoriously unreliable to copy in bulk, unless you could afford £1,000 or more for a professional high speed copier.

Methods of Protection

Thus, the first stage in the development of software protections saw a proliferation of techniques designed to prevent a program from being LISTed – on screen or to a printer. Generally this is achieved by rearranging pointers and 'hiding' bits of code within a program. I shall mention just two of these methods, for the benefit of readers who still require this function but are unaware of how to achieve it.

First, there is the "five pi" or 5 π method for use on finished programs, so called because the programmer inserts 5 π's after each line number in the program. Then type in lines 1 and 2 as follows:

```
1 FORI=1025 TO 8191 : IF PEEK(I)=255THEN POKE
  1.0:I=I+4
2 NEXTI:END
```

RUN, and when READY delete lines 1 and 2. This leaves a program that can be loaded and saved, but lists only the line numbers. However, three drawbacks are apparent: five additional bytes are required for each line, the fact that line numbers are shown gives away the method used, and that any programmer worth his salt can create another one-liner to reverse the process!

The second is more subtle and involves hiding small but essential pieces of code in the listing. Try typing the following:

```
10 A=14:A=15:REM"
```

Press Return and then place the cursor back to the position following the quote marks. Press Shift and Insert 10 times and then Delete 10 times, which should result in a block of reversed T's. Listing, however, will show only:

```
10 A=14
```

While this is not foolproof, if used carefully it can induce hours of confusion in any programmer trying to copy the routine!

Some users may be aware that prototype versions of the Programmers Toolkit actually had an UNLIST command incorporated. Whether this was unreliable, or simply too dangerous to let loose on unsuspecting users is still a talking point where hackers gather.

The bottom line is, however, that all these methods can be broken with a few knowledgeable PEEKs and POKEs. The final nail in the coffin for unlisters was undoubtedly the introduction of a resident monitors with the Basic 2.0 ROM change.

The Busting Of Microchess

The first major breakthrough came with Microchess – for two years the number one best selling program for the PET, and arguably the one most in need of protection. Rumour had it that Microchess couldn't be Saved "because it's Machine Code". This, of course, is nonsense if you have the monitor, and it wasn't long before some lateral thinker realised that there was nothing special about $0400 and produced his first clone. The Independent PET User Group gained notoriety (and very nearly a lawsuit) by publishing the details of how to copy Microchess.

So the marketeers turned back to their lateral thinkers for round two. Someone with a surplus of components and a marked lack of vision said "ROMs", to which software managers around the world replied "Amen".

Space restricts me to just four principal criticisms of this 'breakthrough'. These are:

1) Most ROM-protected packages use the same protection ROM!
2) The advent of Eprom Burners enables pseudo-ROMs to be produced very quickly.
3) As it is considered unwise for untrained businessmen to go exploring in the guts of the computer, each new package must be 'installed' by the dealer (though with professional quality software this is likely to be necessary anyway).
4) Having only three sockets available gives rise to considerable overcrowding with Toolkits, utilities, disk ROMs and others, all competing for the same space.

Wordpro — the first program to make use of ROMs — simply looked at a particular location once to see if the ROM was present. A sophisticated utility can search many K of code for address-references to that block in the memory map, showing the user where to make alterations. Admittedly, the level of cunning has increased — by using Indirect addressing and Jumps, but a good programmer can often 'crack' a ROM in less than one day.

In similar vein, but rather better implemented, is the Dongle, used to protect *Wordcraft*. Physically, this is a small grey box which must be mounted on the cassette port to allow *Wordcraft* to run. However, each Dongle contains a different random electronic code, and upon purchase, a so-called User-Disk is created — individually matched to one Dongle. So although the user can make unlimited backups, and may move the program from system to system (here the Dongle acts like a security key) — any attempt to run a program without the correct dongle present will simply crash the system.

Unfortunately, the cost of producing such devices makes the exercise unrealistic on all but the most expensive business suites. (Incidentally, the unit is encased in *very* hard resin — a most effective way of keeping the contents secret.)

Soft Protection

The bell goes for round three - paradoxically called 'Soft Protection'. This generic term covers all methods that employ no additional hardware. Listed below are some of the more imaginative ones and their respective Achilles Heel — in ascending order of effectiveness.

1. **Auto-run.** Once the program is loaded it will run automatically, and with Run/Stop disabled gives the user no opportunity to re-save the program. However, Jim Butterfield's famous uncrasher, — also known as the Bent Hairpin or Wet Finger methods — gives the determined pirate new-found power in this direction.
   Auto-run is achieved by loading from disk directly onto the Stack, Keyboard Buffer, or BASIC input buffer. An alternative is to alter the CHRGET routine in Page zero during loading, so that only certain commands (e.g. LOAD and RUN) are executable.
2. **Chaining.** By using small loader programs (coupled with coding/decoding routines if desired) — it is possible to ensure that the complete program is never in memory at once. This is becoming increasingly necessary, anyway, as programmers are finding the 32K limitation a severe restriction. This requires, however, that the program disk be constantly on-line — thus limiting the available data-space.
3. Neither of these methods is effective unless coupled with a **Corrupted Directory** to prevent the user from simply taking a Backup or Copying Files across from one drive to another.

All of these fall prey to the latest development in machine code utilities — the Disk Monitor. Akin to the CPU monitor, this enables individual bits, bytes or blocks to be altered, copied or moved. Invaluable to the Software Engineer in restoring corrupted databases, it unfortunately allows the trained operator to make a complete bit-for-bit copy of *any* disk.

Diskette Protection

This brings us to the current state-of-the-art in the anti-piracy business — diskette protection. Compsoft use a form of this to protect DMS; another recent example is to be found in Commodore's OZZ. It is the only method I know of capable of withstanding all the plagaristic tricks discussed so far. That is not to say it cannot be broken, but that the process of breaking and copying takes so long that it becomes uneconomic.

Each diskette has the program recorded in a different way — and must be produced on non-standard hardware. Unfortunately, the OZZ method prevents the user from taking backup copies to guard against power or hardware failures. This brings up the whole question of software guarantees — which could place software houses in a very embarrassing position. Incidentally, I recently won two bottles of Swiss wine betting a would-be genius that he could not produce a second copy the same day! Unfortunately, a good protection method merely acts as red rag to a bull in the minds of some programmers.

If all this sounds just a little bit negative, or leaves you with your head spinning, you are beginning to understand the dilemma facing every software manager and author — to protect or not to protect? So what are the alternatives open to him?

The Software Manager might well say — "Why bother trying to protect software at all?" — the greater the availability of cheap packages, the better the hardware sales of a company like Commodore. However, an across-the-board attitude like that creates a bad environment for commercial software companies and authors — who, if they no longer have confidence in the security of their products, will be reluctant to develop them in the first place. On low-key programs there is no question but that more and more should, and will, be turned over to the public domain. This is beginning to work well in the field of education, where teachers are willing to surrender their programs and simulations, knowing that they will receive hundreds in exchange. And after all, just because you were the first to produce a fast-sort, hex loader or noughts and crosses game (for which algorithms are widely available), does that imply the right to make money on it, when any bright fifteen-year-old could achieve the same in a couple of hours?

Waiting

Secondly, the software originator could wait until the law changes. As most asses are notoriously difficult to get moving, this might entail a long wait. If you try and pin down the point at which an adaptation becomes a new program, you will understand the difficulties. Swiss law says a 25% change in code: though by the time you have translated the prompts of an English program to French, Italian or Schweizer Deutsch, you've changed 25% anyway!

Some lawyers have proposed that a levy be made on the sale of all blank diskettes, to be shared out by authors. The problems of administering such a system are likely to be enormous.

The only real solution lies in the way a program is supported after it is sold. Software rental is one possibility, and there are others. Raise the standard of the Instruction Manual with typesetting and screen pictures, and attempts at photocopying will become obvious. Incorporate a user-registration card as a pre-requisite for obtaining support or assistance on the product; sell software maintenance contracts — a small annual fee for obtaining updates, training and damaged file repair — these are three of the surest methods of weeding out the 'duds' and tracking their sources.

It is my contention that there is more than just royalty money at stake here. Unless we all dramatically change our attitude to software and its protection, then the whole reputation of the microcomputer as a viable business machine will inevitably suffer.

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Is Bridge Partner a Dummy?

PROGRAM NAME:	**Bridge Partner**
PUBLISHER:	**Personal Software Inc.**
DISTRIBUTOR:	**ACT Microsoft, 5/6 Vicarage Road, Edgbaston, Birmingham B15 3ES**
AVAILABILITY:	**Cassette**
PRICE:	**£14**
REVIEWER:	**Peter Sington**

Bridge Partner is a program which plays the defending hands in a bridge deal with the user as declarer. There is no bidding as such but the declarer enters the contract he wants before playing the first card — effectively this merely establishes trumps. That is essentially what the program does but there are a number of other facilities that add greatly to the interest (and novelty) of the system.

At the outset the user is asked to specify a number, called SET OF HANDS, which is then used to seed the random number generator. This in turn produces a series of random deals (each one numbered) in which the North and South hands are displayed. The user can play any that he wishes, pass on to the next or skip to any later deal number in the series. In addition, he can at any time stop playing and look at all four hands, from which point he has the option of (a) playing East as declarer, (b) playing the same hand again, (c) moving to the next deal, or (d) loading a pre-recorded deal from tape. A given number entered as the SET OF HANDS will always generate the same series of deals. Thus it is possible to recreate a particular hand if one can remember the SET OF HANDS number entered (unfortunately this is not shown on the display, although the Deal number is).

In addition to the main program an entirely separate program called "Dealer" is provided. Its function is to record deals on tape. These can be specially selected hands, fed in card by card, or randomly generated ones. In the latter case one has the further option of automatically recording only those hands whose high-card points lie between specified limits. The generation of deals appears to continue indefinitely and I had to arrest it with the STOP key, although there is no mention of this in the instructions. It would be convenient to have all these facilities within a single program but it would not then fit into an 8K machine. For 16K/32K users, though, it would be a considerable advantage and I hope the publishers will see fit to offer a combined version for this important and growing sector of the market.

To play a card one merely presses two keys, e.g. C4 for the four of clubs. Unfortunately, the program rejects 4C, and I found this a continual irritation, although one does get used to it in time. Surely it would not take much additional memory to accommodate either form of entry? The hands are displayed without delimiters between the cards, which is reasonable enough except that the ten is printed as such so that a sequence of Jack, ten, nine, seven is shown as J1097. At first glance this looks like a five-card suit and can be thoroughly off-putting. In my opinion it would be better to use T for the ten. I suspect it would also shorten the program. Apart from these minor points, I found the program ran very smoothly. It is particularly useful to be able to swap hands (any of the four can be declarer) and to try out different contracts; much can be learnt by doing this.

The standard of play offered by any program of this kind is, of course, related to the amount of memory available.

Continued on 37

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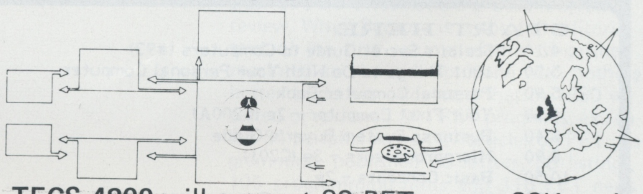

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THE GOOD COMPUTER BOOK GUIDE

Edited by Ron Geere

The books that can help you; the books that will hinder — we tell you which are which

This guide has been compiled to assist the reader in selecting books relevant to his or her computing interest. Now the difficult part; your interests and computing knowledge are as varied as the range of computing books. There has been a veritable upsurge in books on microcomputing and as a result, this guide can only cover a small sample of those available. It is assumed that the reader of PRINTOUT has the PET/CBM computer as the machine of interest. Likewise the appropriate dialect of BASIC is assumed for there are many, and an irrelevant one could confuse the novice.

The main limitation of this guide is that a book rated poor may not be so in absolute terms; it simply reflects our view on how useful it is likely to be to the beginner, the business user, the PET/CBM-owner and the like. The final arbiter must be you, the reader. There is no substitute for a trip to a good stockist of computer books and choosing for yourself.

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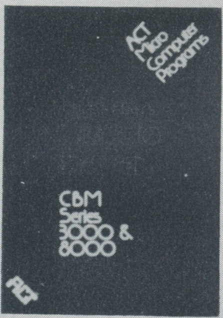
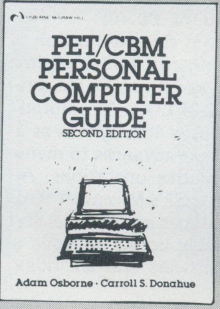


1.1 HITCH–HIKER'S GUIDE TO THE PET

Chris Preston (ACT Petsoft £8.00)

Opening the cover we half expected to see the words 'DON'T PANIC!!', but no. This guide is a small document comprising 40-odd A5 pages. It contains no waffle and is virtually 100% useful information covering 3000, 4000 and 8000-series machines. The five sections cover useful memory locations, useful ROM routines and CompuThink's DISKMON. In each case there is sufficient description to allow the reader to make use of the information. The guide is inexpensive and a useful addition to one's store of information or for anyone about to get to grips with machine-code programming.

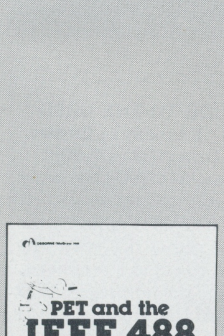

PET/CBM PERSONAL COMPUTER GUIDE
SECOND EDITION
Adam Osborne · Carroll S. Donahue

1.2 PET/CBM PERSONAL COMPUTER GUIDE

Adam Osborne & Carroll Donahue (Osborne/McGraw-Hill £10.00)

Not just a guide to the computer, but to the disk and printer variants too. The Guide gives notes on sequential files, user files and much hitherto unpublished information. The text acknowledges the possibility of bugs in the sample programs, which is just as well — several of the examples do indeed have bugs. Even the table of reserved words and abbreviations has the abbreviations omitted (presumably for brevity!). The Guide defines all PET's BASIC statements and functions, syntax and restrictions and gives examples of each. Appendix A is perhaps best ignored (one reviewer described it thus 'takes Commodore's SNAFU and proceeds to FUBAR it'). Confusion could arise on the different versions of BASIC. References to BASIC 3.0 refer to the third revision, otherwise known as level III, i.e. BASIC 2.0 (upgrade ROM) — got that? The section on printer output seems to confuse carriage return with line feed; but for all that, if you want a proper handbook for your PET, this is it. Commodore have even gone as far as to include it in with recent deliveries in the U.S. (even though the dealer may take it out!)

Of all the books reviewed here, the Editors consider this the most useful for any PET-owner, beginner or advanced, even though we wince when semi-conductor memory is referred to as 'core'.



1.3 PET & THE IEEE–488 BUS

Eugene Fisher & C.W. Jensen (Osborne/McGraw-Hill £9.95)

Cartoons abound in illustrations of various ideas, but you may find the American kiddies guide approach insulting to the intelligence. The meat of the book is very tasty. Some readers may find parts of the book heavy going, depending on one's academic background, but there is something for everyone. The book covers the bus description, timing, PET quirks, a PET to Centronics interface and bus-compatible products. (The latter will date quickly and is of limited interest). The book concludes with an index.

1.4 THE PET REVEALED

Nick Hampshire (Computabits £10.00)

Concise and generally accurate summary of PET's technical aspects. In it is the information Commodore were so cagey about releasing — ROM listings, circuit diagrams and the like. Contains a number of useful subroutines, e.g. TRACE and DOUBLE DENSITY PLOT, but material of a tutorial nature is sparse. Not a 'How to Use Your PET Manual', more something to grow into. Recommended reference material.

1.5 UNDERSTANDING YOUR PET–TIS

(ACT Microsoft £15.00)

Once upon a time there was a set of five PET Workbooks, then six. Now, with minor omissions and some additions, they have metamorphosed into a useful step-by-step guide to using the PET. Lots of exercises and short sample programs. Machine code and Disk handling not covered. Easy-to-follow for beginners.

1.6 THE PET COMPANION

(PRINTOUT £9.95)

Modesty prevents us from giving this collection of PET information a truly objective review. Why? Because it is the full editorial text of the first volume of this magazine, reprinted and bound. Someone with nothing better to do has calculated that in 1980 we tested or reviewed 141 PET programs, evaluated 54 peripherals, ran 27 articles on PET programming, published 53 letters, 88 listings, 105 programming hints and 116 PET news stories. It is all here.

To be published May 22nd.

2. LEARNING PROGRAMMING

FIFTY BASIC EXERCISES
J.P. LAMOITIER

2.1 FIFTY BASIC EXERCISES

J.P. Lamoitier (Sybex £8.75)

Written for a lesser machine than the PET but most programs will run without modification. The reader is led gently through simple examples to quite complex programs, all fully explained and presented with flow charts. In general the programs, besides being instructive have practical value, although we doubt the usefulness of the method of estimating the value of pi. Appendices and an index complete the work.

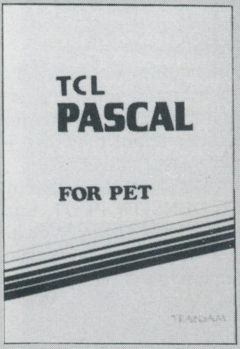
THE GOOD COMPUTER BOOK GUIDE

programming the
6502
RODNAY ZAKS

2.2 PROGRAMMING THE 6502

R. Zaks (Sybex £9.10)

The first edition had many errors; this is the third edition, so by now the author should have got it right. Although most of them have been corrected, we were disappointed that many of the errors of the first edition have been perpetuated. Even so, we still think that of all the 6502 programming books, this is the easiest to follow. Most machine code programmers will feel happier with it at their elbow.



2.3 TCL PASCAL FOR PET (Transam £9.00)

TCL Pascal is an implementation of the standard Pascal language designed to run within 32K of memory. This reference handbook contains a brief beginner's guide. Extensions to the Pascal are covered to exploit PET features such as the jiffy clock, RND generator, and hex I/O. Essential reading if you have the disk-based Pascal compiler; pretty useless if you haven't.

INTRODUCTION TO
PASCAL
INCLUDING UCSD PASCAL
RODNAY ZAKS
SYBEX

2.4 INTRODUCTION TO PASCAL

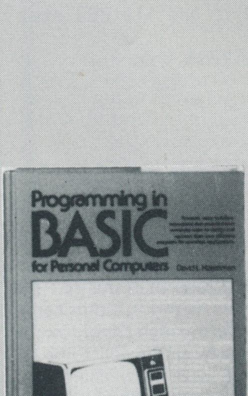
R. Zaks (Sybex £8.70)

Designed as both tutorial and reference text on Wirth's and UCSD Pascals, this is an excellent treatise on the subject. The syntax of the language is illustrated by traditional Pascal diagrams. Questions, answers, appendices and an index complete the book. Yes, you've guessed it — we liked it.

2.5 LIBRARY OF PET SUBROUTINES

Nick Hampshire (Computabits £10.00)

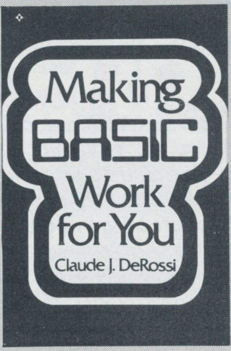
We think this book should have been entitled "All You Ever Wanted To Know About Handling Databases On PET Plus A Lot Of Other Rather Clever Stuff." A storehouse of immediately useable programs — listings being the main content, and well reproduced too. Recommended.



2.6 PROGRAMMING IN BASIC FOR PERSONAL COMPUTERS

D.L. Heiserman (Prentice-Hall £11.65)

Which personal computer is immediately apparent on looking at the book — and it's not the PET! A glance at the text reveals the American origin of this work. Expressions such as 'goof-proof' occasionally appear, but not to excess. There are 14 chapters each explaining something new. The concept of flowcharting is introduced to good effect at chapter 4. The text is clear, easy to read and explains the subject well but one is frequently reminded that it wasn't written for the PET user.



2.7 MAKING BASIC WORK FOR YOU

Claude J. DeRossi (Prentice-Hall £3.85)

Although published in 1979, the author brought back memories of our computing days of the '60s. The 'introduction' introduces the reader to signing on to a time-share terminal (do they still exist?) and chapter 3 describes the superfluous LET statement, still required on the specific variant of BASIC used. References to a teleprinter as the terminal device complete the picture. The book is aimed at the beginner, but sadly misses.

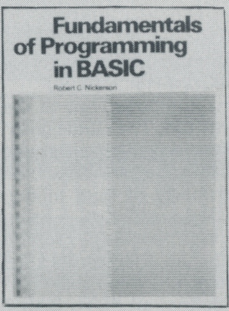
NCC
Elements of
BASIC

2.8 ELEMENTS OF BASIC (1977)

R. Lewis & B.H. Blakeley

(NCC Publications £3.00)

The second edition predates the personal computer era and this is reflected in the program listing. The book starts by assuming that you have a reasonable knowledge of flowcharts. Now since BASIC by definition is intended for beginners, this presumption is somewhat invalid. Program listings are reproduced from the ubiquitous teleprinter and, just to confuse the beginner, the UK pounds sign is used for '$' and a hash (#) for '%'. This is the sort of book one would find on the 'odd size' shelf of a public library. Leave it there.



2.9 FUNDAMENTALS OF PROGRAMMING IN BASIC

R.C. Nickerson

(Winthrop Publications £8.40)

The version of BASIC in this publication is American National Standard (ANSI) minimal BASIC. Non-standard variations relate primarily to DEC BASIC—PLUS. Structured BASIC techniques are used throughout as a matter of course. The text advances to menu-driven programs and matrix operations. Although not the same as PET's Microsoft BASIC, the programming techniques and tutorial style make this a commendable book. Included are examples, questions, answers and an index.

2.10 6502 ASSEMBLY LANGUAGE PROGRAMMING

L. Levanthal

(Osborne/McGraw-Hill £10.75)

Ain't no such thing as the ideal introduction to machine code. Arguments still rage between those who favour this book and proponents of the Sybex volume. Personally, we have a slight preference for the Levanthal book if only because it suffers from less typographical errors. Organisation is marginally better too. Most machine code minders we know have both, however.....

2.11 BEGINNER'S GUIDE TO THE UCSD PASCAL SYSTEM

Kenneth L. Bowles

(BYTE Books - McGraw/Hill £7.90)

Written for the beginner, this 200-page work will serve as both a tutorial and reference book. Its style is such that a terminal is required for progression through the rather dry text. The appendices are intended to act as a reference, but are weak at providing the language syntax in handy reference form. Not the best Pascal book for the PET user.

3. APPLICATIONS

6502
applications book
RODNAY ZAKS
6502 SERIES
SYBEX

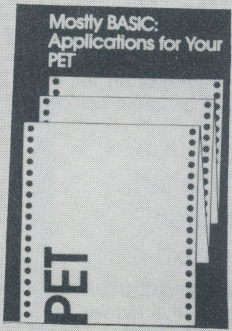
3.1 6502 APPLICATIONS BOOK
R. Zaks (Sybex £9.10)

Not really the 6502, but the peripheral chips described in detail - and how to use them. These chips are as complex as the processor itself and programming them can present the novice with unforeseen problems. This book should make the going smoother.

6502
GAMES
rodnay zaks
6502
SYBEX

3.2 6502 GAMES
R. Zaks (Sybex £9.10)

The ten games in this books are listed for the SYM board and are orientated towards the Sybex games board. Some familiarity with the 6502 and its assembly code are a pre-requisite but the code and the algorithms are all fully explained. This could form a useful reference should you intend to write your own games in machine code.


Mostly BASIC:
Applications for Your PET
PET

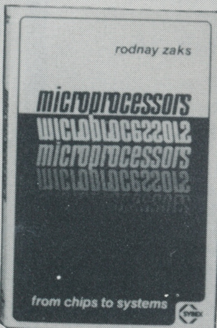
3.3 MOSTLY BASIC: APPLICATIONS FOR YOUR PET H. Berenbon
(Howard W. Sams & Co. Inc £7.10)

For 'your PET' read 'any old machine understanding BASIC', for rarely are any of PET's features exploited, except for the occasional "CLR" to mean the 'clear screen' character. No multiple-statement lines, no graphics, just poorly written BASIC. The ultimate comes in chapter 27 where a 100-line program is proffered to perform conversion from hex to decimal and vice versa!

BASIC-Pack
Statistics
Programs
for Small
Computers
Dennie Van Tassel
BP

3.4 BASIC–PACK STATISTIC PROGRAMS
D. van Tassel (Prentice-Hall £11.00)

Thirty three well-documented programs are presented in a BASIC subset for portability. Each program has a description, a sample run and a listing. Where appropriate the program limitations are noted. For use on the PET the programs could be tidied up and adapted for one's own use. Six tables and an index complete the publication. If statistical computations are your requirement, then this book should adequately meet your need.


rodnay zaks
microprocessors
microprocessors
from chips to systems
SYBEX

3.5 MICROPROCESSORS – FROM CHIPS TO SYSTEMS
R. Zaks (Sybex £7.00)

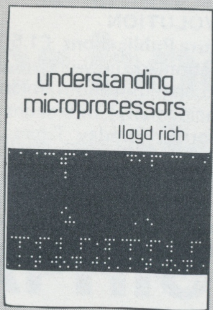
The author's claim 'No preliminary knowledge of computers or microprocessors is required to read this book' assumes that in so doing the reader didn't intend to understand it. Not that this is a poor book; it contains a wealth of useful information, but some knowledge of computing or electronic engineering would be a distinct advantage. The book discusses the different microprocessor architectures with advantages, disadvantages and comparisons. Covers the whole gamut of microprocessor systems, predominantly for the 6800 and 8080 families. Something for everyone here.

4. THE NEW TECHNOLOGY

from
APES
to
ASTRONAUTS
by Adrian
Berry

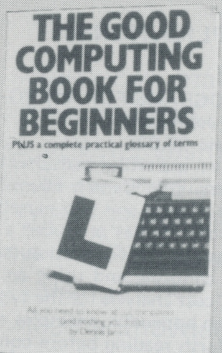
4.1 FROM APES TO ASTRONAUTS
Adrian Berry (Daily Telegraph £1.45)

Are you interested in the universe, evolution, God, Einstein, ghosts, UFOs, astrology, astronomy, paradoxes, space travel, or computer intelligence? Then for the small cost of this book you can have them all. Not much on computers, and nothing at all on the PET, but a fascinating book all the same. Incredibly this gem of a book even has an index! Written in an easy style, it is not the sort of book to read on the train – you might pass your stop.


understanding
microprocessors
lloyd rich

4.2 UNDERSTANDING MICROPROCESSORS
Lloyd Rich (Prentice–Hall £11.65)

The introduction states that it is sometimes believed that microprocessors are very difficult to understand. Reading this book may well reinforce that view. There is a lot of text on logic gates and digital electronics and good solid stuff like magnetic-core memory planes (erasable PROMs get a small paragraph). Strangely for a 1981 publication, the obsolete 10-year old 4004 microprocessor appears in one example. Contains some interesting stuff, but doesn't live up to its title.


THE GOOD
COMPUTING
BOOK FOR
BEGINNERS
PLUS a complete practical glossary of terms
L

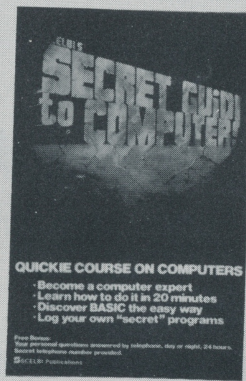
4.3 THE GOOD COMPUTING BOOK FOR BEGINNERS (1980) Dennis Jarrett
(ECC Publications £1.95)

I am not sure if the 'good' refers to 'computing' or the 'book'. For the novice whose acquaintance with computers doesn't extend beyond the ones that print the electric bill, this book could be a useful reference. It is described as an introduction and glossary. 80% of the book is the glossary, a handy buzzword dictionary, and the rest explodes myths and gives an expose on computing. Although this book is for beginners, I found the author's style so readable I was compelled to read much of what I already knew; yes, it actually was interesting!

YOUR FIRST
COMPUTER
A GUIDE TO
BUSINESS
AND
PERSONAL
COMPUTING
RODNAY
ZAKS

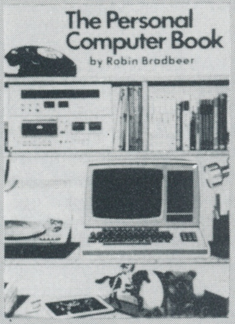
4.4 YOUR FIRST COMPUTER
R. Zaks (Sybex £not yet known)

Reading this was, for me, reminiscent of rummaging in the attic, plenty of bits and pieces, but nothing really useful. But for someone about to, or having just acquired their first computer, Zaks takes the reader on a guided tour of the microcomputer scene. A few cartoons complete the picture.


SCELBI'S
SECRET GUIDE
to COMPUTERS
QUICKIE COURSE ON COMPUTERS
·Become a computer expert
·Learn how to do it in 20 minutes
·Discover BASIC the easy way
·Log your own "secret" programs
SCELBI Publications

4.5 SCELBI'S SECRET GUIDE TO COMPUTERS Russel Walter
(Scelbi/Mine of Information £4.20)

A fun book that promises to teach you "how to do it in 20 minutes". And, believe it or not, it does just that. Although it is aimed at children, some adults may enjoy this gentle guide to BASIC. The author shows no overt preference for a particular dialect or system (they are all insulted equally) but we suspect he may have shares inTandy. There are a few notable omissions including string handling, but overall we think the *Secret Guide* makes a good present for children. Anyone with an O-level education would be well-advised to look elsewhere.



4.6 THE PERSONAL COMPUTER BOOK

Robin Bradbeer (Gower Publishing £5.25)

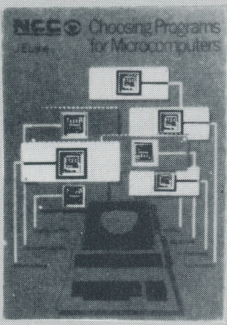
The author needs no introduction to readers of PRINTOUT, so I won't give him one. His book must be considered unique in that it contains a bibliography of selected microcomputer books which is recursive (i.e. it includes itself). Other appendices cover manufacturers and distributors, UK computer clubs and regional groups (where is Stock-on-Trent!?), together with a list of magazines. The main text is aimed at introducing the novice to microcomputing and includes a useful market survey on what to buy, plus an introduction to computing and simple programming.

4.7 THE MICRO REVOLUTION

Peter Laurie (Futura Publications £1.50)

The compleat introduction to the wonders of satellites, optical fibre communications, microwaves, and (almost incidentally) microcomputers written by a former Sunday Times journalist. Gripping reading — he even succeeds in making Bandwith interesting — and some very funny stories. Some bizarre speculations on the social implications. Recommended. (Not to be confused with the less interesting book by Peter Large of the same title.)

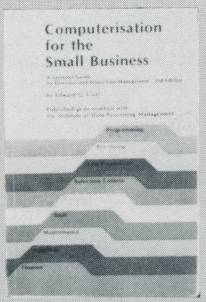
5. BUSINESS APPLICATIONS



5.1 CHOOSING PROGRAMS FOR MICROCOMPUTERS

John Lane (NCC Publications £8.00)

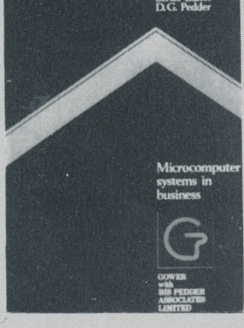
The author, John Lane, is a senior consultant in the National Computing Centre microprocessor development team and like myself is a Chartered Engineer. He has produced a book which is authorative and well-structured. The contents cover choosing and using an application package, cost analysis for the types of packages and in an appendix, examples of specific packages. Worth reading before committing one's money.



5.2 COMPUTERISATION FOR THE SMALL BUSINESS

E.G. Cluff (Gower Publishing £9.50)

Not recommended for the PET user. The author is main-frame orientated and one can detect a substantial degree of condescension in respect of 'personal' computers. In addition his comments on dealers and applications packages are not entirely representative of the Commodore business dealer network and in places positively erroneous (things have changed since 1979). Not to worry though, Cluff's chapter on personal computers runs to all of five A5 pages and doesn't even have the checklist which terminates all other chapters.


Series Editor D.G. Pedder
Microcomputer systems in business
GOWER with BIS PEDDER ASSOCIATES LIMITED

5.3 MICROCOMPUTER SYSTEMS IN BUSINESS

D.G. Pedder (Gower Publishing £25.00)

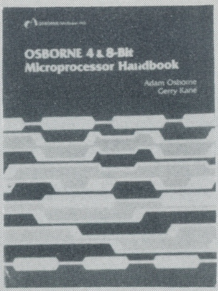
This publication is in the style of a survey or report. Accordingly it has a high cost/page ratio. Its substance comprises market trends, surveys and analyses which are no doubt the fruits of much research.

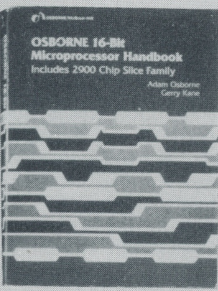
5.4 SMALL BUSINESS PROGRAMS

S. Roberts (Elcomp)

Atrocious scissors and paste job. The first spelling error appears on the cover, but is not allowed to be lonesome. Binary recommendation: thumbs down!

6. ENGINEERING APPLICATIONS




OSBORNE 16-Bit Microprocessor Handbook
Includes 2900 Chip Slice Family
Adam Osborne
Gerry Kane

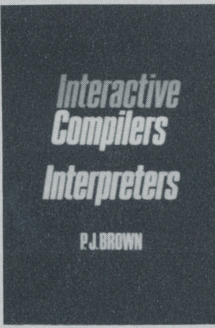
6.1 4 & 8-BIT MICROPROCESSOR HANDBOOK

(A. Osborne & G. Kane £15.95)

16-BIT MICROPROCESSOR HANDBOOK

A. Osborne & G. Kane (Osborne/McGraw-Hill £13.25)

These handbooks represent a two-volume set of microprocessor family data books. A wealth of information has been packed into these manuals and it is valuable for the system design engineer to have access to not only the processor but also to the related peripheral chip design data. The manuals include comparisons and indicate fundamental differences between, for example, the 6800 and 650x families. The presentation of the information is superb. Bold text is used to highlight key statements and boxed headings on the right-hand side of the page allow rapid searching for key information.



6.2 WRITING INTERACTIVE COMPILERS & INTERPRETERS

P.J. Brown (John Wiley & Sons £11.85)

If you think this book will tell you how compilers and interpreters work so that you can write your own, then you will be disappointed. The text is directed at giving the potential writer advice and guidelines, rather than 'how-to'. Fortunately the book does cite other works for the ambitious programmer as well as giving guidelines and pitfalls relating to the program implementation.

The prices of computer books do fluctuate, principally because so many are imported. Those quoted here were correct at time of going to press. It is worth checking with your local dealer or one of the mail order suppliers, such as Mine of Information or L.P. Enterprises.

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After the best selling 'Pet Revealed' and 'Library of Pet Subroutines' comes another book from Nick Hampshire

OFFICIALLY APPROVED COMMODORE DEALER

PET GRAPHICS

The way information is displayed on the screen can make or ruin any program whatever the application. This book shows how you can fully exploit the graphics possibilities of the PET, essential reading for anyone wishing to write good useful programs. The book contains dozens of example programs including a comprehensive graphics package written in machine code (resides in the top 2K of memory). The contents of 'PET Graphics' include: How the PET display works — designing a display format — cursor control in PRINT — using POKE — an introduction to the machine code graphics package (you don't need a knowledge of machine code to use this package, but the full source code listings are given for those interested), among the packages over 30 routines are those to draw — bars, borders, character blocks, reverse field blocks, double density point and line plot, fine density bar plot, block scrolling, scrolled multiple page screen, repeat key and protected screen areas, multiple page displays, macro character generator, etc. Other sections of the book cover interactive graphics, with full circuit designs and comprehensive support software for adding a light pen to the PET simple switch and joystick input devices a review of add on hardware to give the PET high resolution graphics capability.

Price £10.00

All the programs in 'PET Graphics' are available on CBM format disk price £10.00

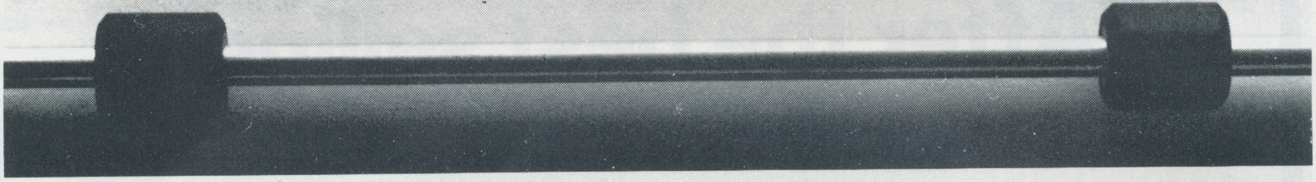
Cheques payable to Computabits Ltd.

OFFICIALLY APPROVED COMMODORE DEALER

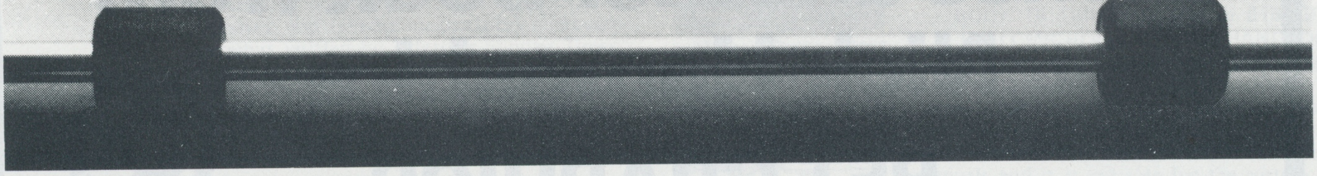
COMPUTABITS LTD

P.O. BOX 13, YEOVIL; SOMERSET.

IF YOU DON'T WANT A WORD PROCESSING DOCUMENT THAT LOOKS LIKE THIS,



YOU NEED A PRINTER THAT PRINTS LIKE THIS.



The more your system can do, the better your terminal should be. That's why, if you're adding text editing capability to your data processing system, you should also think about adding a quality daisywheel terminal to replace the matrix terminal you're using now. And the best-quality terminal you can buy is one by Qume.

A printer for every application.

No matter what application you choose, Qume makes a printer to fit it.

Like our Sprint 5® KSR and RO, which have achieved the reputation for being the easy-to-use leader in letter-perfect terminals. You can have 50 different typestyles to use with it, including APL, scientific symbols and international character sets.

And there's the Sprint 5 Wide-Track™ with RS-232C interface. The first character printer data terminal in the world capable of handling paper up to 28 inches wide. That's a full 264-column printing area. Sprint 5 Wide-Track adds an entirely new dimension to the printed word.

The best backup in the business.

Not only do we make the best printers, but we also provide the best support to back up what we sell. That means excellent service to the OEM and the end user, and one of the best supplies programs in the business.

So if you're getting ready to upgrade your system, then it's time you upgraded your printer as well. To a Qume.

For more information contact your **Qume** [UK] AUTHORISED DISTRIBUTOR

ACCESS DATA COMMUNICATIONS LTD.,
228 High Street, Uxbridge, Middlesex. Tel: (0895) 30831.

DAISY TERMINALS LIMITED, Bridge Road,
Haywards Heath, West Sussex. Tel: (0444) 57546.

FACIT, Maidstone Road, Rochester, Kent.
Tel: (0634) 401721.

ISG DATA SALES LIMITED, Unit 9, Fairacres Ind. Estate,
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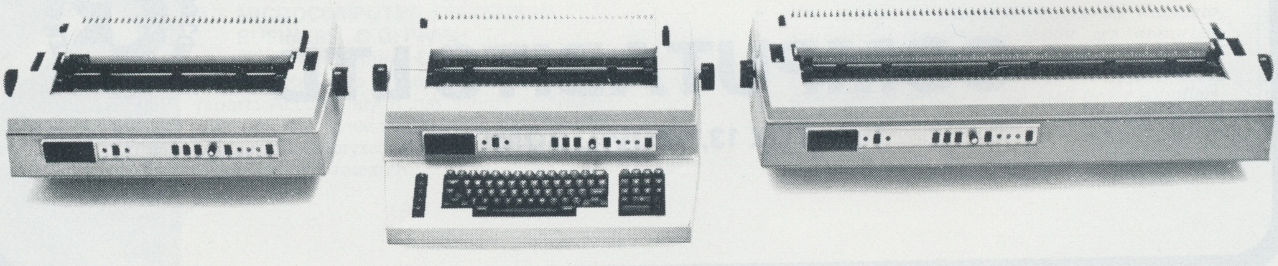

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Screen Scratchpad

by Julian Allason

In the great tradition established by Lindsay Doyle with his two line 'Incredible UnwordProcessor' (PRINTOUT, Feb/March 81, p.37), we offer you an all purpose telephone call/appointments/things-to-do reminder program. This one is just a single line long.

Despite its simplicity, it really is surprisingly powerful, thanks to PET's excellent screen editor. Here is the line.

```
0 PRINTCHR$(147):POKE59468,12:FORJ=ITO25:PRINT:NEXTJ:
                                   PRINT"RUN[home]";:LIST1-21
```

Key this is exactly as it appears and press Return. To set up the numbering of your list type a 1 followed by a full stop followed by Return. Repeat this all the way up to 20. For visual clarity I usually make line 21 a row of 74 equals signs, but it could be 21 followed by a full stop. Now Run the program, and type in the names and numbers of the people you want to telephone, pressing Return each time. These names should cover the full stop on the blank line you are using. Now reRun. Presto!*

One less excuse for not 'phoning the wife.

Let's assume you have just put the 'phone down on number three and want to take him off the list. No problem. Simply type 3 followed by a full stop and two Carriage Returns. The program will automatically reRun. To add a new name, move the cursor up to a blank line (especially easy if you have an 8032 with automatic repeat on the cursor control keys), and start typing. One return and it's in memory. What could be easier?

Here's a brief explanation of what the line does. CHR$ (147) is the clear screen command; PRINT"clear screen" using the Home key shifted would work equally well. POKE 59468,12 ensures the PET is in upper case/graphics mode; the BASIC interpreter loses shifted characters in lower case mode. The FOR.....NEXT loop moves the cursor to the bottom line to print the word RUN. The cursor then homes and your data lines are listed.

Don't forget to Save the program before switching the computer off.

**35 if you have a small screen PET.*

Is Bridge Partner a Dummy?

Continued from 27

8K is not very much for a bridge program and I was agreably surprised at the level achieved within that constraint. Nevertheless, if one is looking for expert defence then one is expecting too much. I estimate that a competent declarer will win on average at least one more trick than he should on each contract. This, despite the fact that there is no bidding information available to him. On the computer side, there does seem to be some interaction between East and West in the selection of West's opening lead, which is often directed towards East's highest honours, irrespective of suit length. West would not normally have this information and it leads to some odd openings. It would be more realistic to assess East's points and, if of biddable strength, to have West lead the highest card of East's longest suit on the assumption that East would have bid this. As to East, he appears singularly reluctant to return his partner's opening suit — a habit that could lead to ugly scenes round a real bridge table!

Points like the above will not prevent users from having a great deal of instructive fun from the program; I can think of no better way of improving the quality and speed of one's play without involving other people. It appears to be bug-free and is accompanied by clearly written and professionally-produced documentation. It also seems to be crash-proof, although the STOP key is not disabled. This does not matter much, but I would like to have seen the keyboard buffer cleared before each input statement, as there are necessarily many pauses during running. In all, I can thoroughly recommend this program, especially for owners of 8K machines, who are unlikely to find anything better that will fit in their memories.

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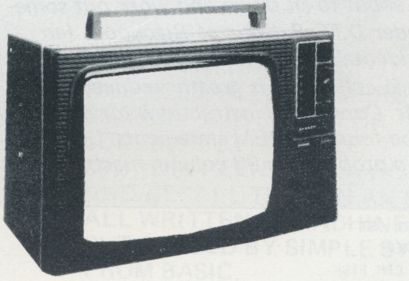

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TOMMY'S TIPS

Harry's Tips

Allow me to introduce Harry, resurrector of crashed disks and my counterpart in the excellent newsletter put out by the Independent PET User Group (South East). To give you the flavour, here are Harry's most recent tips:

> Did you know that by typing >U: that a soft reset takes place (on the DOS MPU) in the 2040/3040 disk drives?
>
> Also, if you only want to view program, sequential or user files from the disk directory; one need only type >$0:*=P or S or U as needed. DOS support has to be already loaded.
>
> Certain 4000 series PETs have been fitted with the wrong ROM in the 'B' slot and, to tell if yours is one of them, type and then press 'RETURN'. If your machines crashes then the offending ROM needs to be changed for one marked '23'.
>
> Seven of the graphics characters in the printer do not come our correctly due to a fault in the printer software. These are the characters that change on the screen when switching from upper to lower case and are not visible when the PET is in Graphics mode. *(Another reason from CBM producing the debugged '07' ROM - Ed.)*

Harry is Harry Broomhall, and if you have a crashed disk, Harry and his LAZARUS program should be able to recover the data for you for a modest fee. Contact him at Heronview Ltd., 3 Errol Street, London EC1Y 8LY.

For information about membership of IPUG (S.E.) send a stamped addressed envelope to Wing Commander M.F. Ryan at 164 Chesterfield Drive, Riverhead, Sevenoaks, Kent.

Clearing the 2nd Cassette Buffer

Having filled the second cassette buffer via a SYS826, I now want to get rid of its contents. Executing a NEW only seems to clear BASIC programs out of the PET. SYS64721 gives a cold start but the second cassette buffer remains filled with the program. Any ideas?

Bill Bond

Let's work backwards on this one, Bill. All that NEW does is reset PET's pointers and clear the first line address of the program, so that's no good. SYS64721 resets the memory, but only that part of it starting at location 1024. That's exactly why the second cassette buffer is such a good place to store a machine code program; no one can monkey with it accidently. There are two ways of getting rid of it; POKE it out or activate the second cassette filing system. You could try this line:

100 FORX=826TO1017:POKEX,O:NEXTX

Old Chestnut

I was amused to see that several software houses are still offering Hex to Decimal conversion programs for sale. Clearly a demand exists; so with the compliments of reader M. Broadway, here is a very short routine to perform the conversion for you:

```
10 YY=0:INPUT"HEX = ";W$:FORT=0TOLEN(W$)-1
20 Z=ASC(MID$(W$,T+1,1)):IFZ>47ANDZ<58ORZ>64ANDZ<71THEN30
26 GOTO10
30 Y=((Z-48)-(INT(Z/65)*7))*(16↑ABS(T-(LEN(W$)-1))):YY=YY+Y:NEXT:PRINTYY:GOTO10
```

Speeding up Garbage Collection

Everyone is worried about the garbage collection problem. That's the condition in which PET appears to go dead for minutes on end while it conducts some leisurely internal spring cleaning. One solution is to upgrade to the latest ROM set, of course. But there are other means of tackling the problem, and I was about to sit down and work out something snappy when reader D.M. Balfour of Blackpool (an aerial photographer incidentally) sent me this routine:

The incidence of garbage collection is greatly reduced. This version is for new ROMs. Conversion instructions for owners of old ROM PETs will be found in REM statements. Garbage collection shouldn't be a problem on 80 column machines or those with BASIC 4.0.

```
10 GOSUB9950:REM UNSHIFTED GET
20 GOSUB9970:REM Y/N ANSWER
40 GOSUB9999:REM SAVE TO CBM DISK
9950 A=PEEK(48):B=PEEK(49)
9952 GETZ$:IFZ$=""THEN9952
9953 REM '%' REENABLES STOP KEY                 '!' DISABLES  STOP KEY
9954 VZ=VAL(Z$):Z=ASC(Z$):POKE48,A:POKE49,B:IFZ=37THENPOKE144,46:GOTO9952
9956 IFZ=33THENPOKE144,49:GOTO9952
9958 IFZ<160ORZ>224THENRETURN:REM NON█ SHIFTED INPUT ONLY
9960 POKE59468,14:PRINT"▚PLEASE RELEASE SHIFT/LOCK▔":PRINT" ";
9962 FORH=1TO25:GOSUB9995:FORL=1TO25:NEXT:X=14:IFH/2-INT(H/2)>.4THENX=12
9964 POKE59468,X:PRINT"▮▚*▬";:GOSUB9995:FORL=1TO25:NEXT
9966 PRINT"▮ *";:NEXT:PRINT"▮ ▔]":GOTO9952
9970 PRINT"▚  ▚OK (Y/N) ?
9980 GOSUB9950:IFZ<>89ANDZ<>78THEN9980
9990 RETURN
9994 REM USER PORT BLEEP FOR ERROR MESSAGE
9995 POKE59464,99:POKE59467,16:POKE59466,15:POKE59467,0:RETURN
9999 Z$="0:PROGRAM NAME"
10000 OPEN15,8,15:PRINT#15,"S"+Z$:SAVEZ$,8:VERIFYZ$,8:CLOSE15:STOP
10001 REM ↑ WILL SAVE TO CBM DISK
20000 REM NEW ROM 144,49=OLD ROM 537,136
20010 REM NEW ROM 144,46=OLD ROM 537,133
20020 REM NEW ROM 48/49=OLD ROM 130/131
20030 REM REMOVE DISK INSTRUCTION FOR OLD ROM
20040 REM ON 80 COL.AND VER 4 BASIC 48/49 IS THE SAME
20050 REM THE POKE 144 FOR STOP IS POKE144,88 TO DISABLE
20060 REM AND POKE144,85 TO ENABLE STOP KEY
```

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TOMMY'S TIPS

Calculating Screen POKE Positions

What a pain it is moving things around on PET's screen under program control. Sure, there are clever techniques for setting up string variables full of cursor control characters and then using the string handling commands to manipulate them. But that's too much like work.

The simplest method is to POKE whatever character you want into the correct screen memory location. On all 40 column PETs these run from 32768 (top left) to 33767 (bottom right). So to put a Heart character in the middle of the screen you would need to POKE33268,83.

It is calculating the screen location that's such a pain. So I am indebted to reader Granville Kirkup for the following short routine, which prints the screen POKE numbers in their correct positions. Since each number has five digits, Granville has sensibly chosen to print only every sixth location number. All you have to do is RUN it and press the SHIFT key. Press SHIFT again and you get the next screen position numbers. To avoid scrolling the last few positions are omitted. Good work, Granville!

```
10 A$="      ":FORA=0TO5:WAIT152,1:PRINT"□";LEFT$(A$,A);
20 FORP=32768+ATO33757+ASTEP6:PRINT"●";RIGHT$(STR$(P),5);:NEXT:NEXT:GOTO10
30 REM OLDROMS WAIT 516,1
```

From Screen to Printer

I use PET's screen for creating circuit diagrams. Is there any way of transferring the finished graphics to my Commodore printer?

Gunther Schell

I have concocted a short routine to print the first twenty-three lines of the screen out onto the printer. Once you are satisfied with your drawing (although the routine will handle capital letters as well) type RUN and presto! instant hard copy. The routine starts at line 100. Line 90 is just a sample screen display and can be omitted.

```
 90 PRINT"□":FORA=1TO23:PRINTA;A;A;"D";"A";"▒ ▞ ▞◤◤":NEXTA
 100 OPEN6,4,6:PRINT#6,CHR$(18):FORI=1TO25:PRINT"▣":IFI<2THEN130
 110 IFI<3THENPRINT:GOTO130
 120 FORJ=1TOI-1:PRINT:NEXTJ
 130 OPEN3,3,0:INPUT#3,A$:OPEN1,4,1:PRINT#1,A$:CLOSE1:CLOSE3:POKE174,0: NEXTI:CL
OSE6
 100 INPUT" NAME     ▮■■▮";A$:IFASC(A$)=160THENPRINT".T]":GOTO100
```

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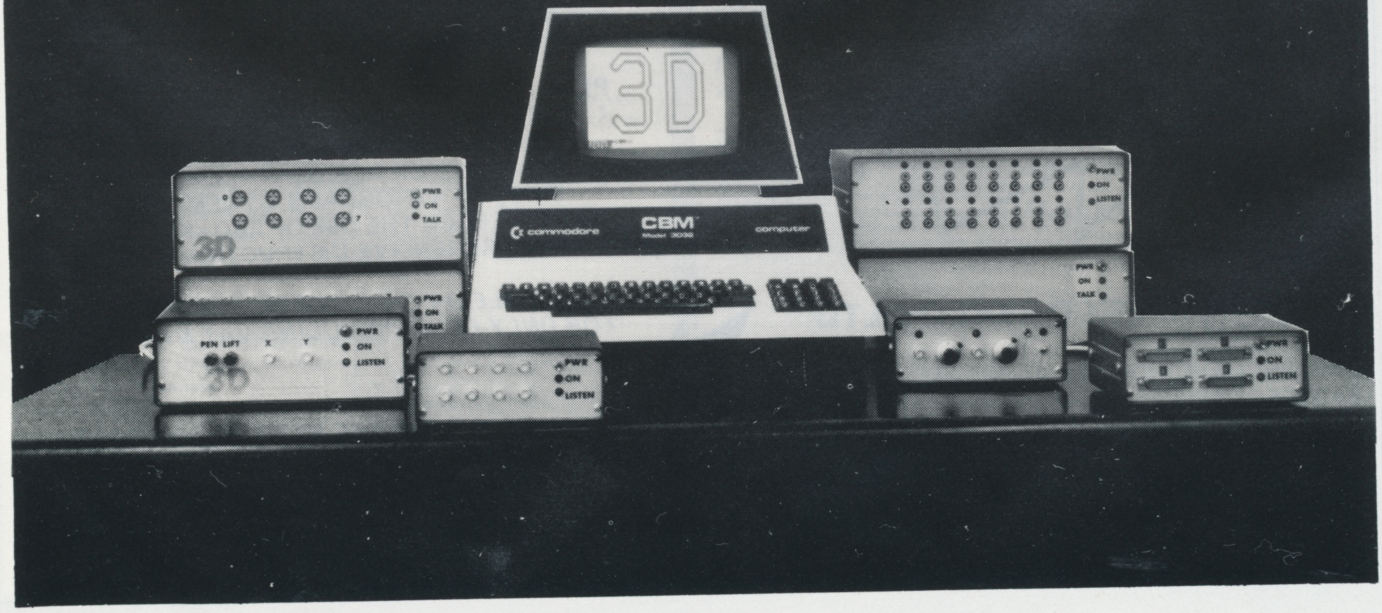

A Beginners Guide to Interfacing

by Dennis Jarrett

"When you look at it carefully and logically" says Dr. Kibasi, absentmindedly patting one of the PETs in his office, "Most people just can't use all of it." What's he talking about? thinks the intrepid reporter, scribbling it all down just in case.

Well, he is talking about the number of different things that can plug into one PET — if you know how to do it. For a start you can attach 255 inputs and 255 outputs to the PET's user port, in theory. The IEEE port can be made to drive a total of 1,600 I/O lines. And on top of that there's still the expansion memory port, with which Dr. K and his friends at 3D Digital Design and Development can do really quite wonderful things. So in total there can be quite a lot of things hanging on to your PET.

With the experience of hindsight, I can assure readers that people who compile glossaries and microcomputer dictionaries tend to thrash around a bit when they are invited to define 'interface'. The worthy efforts of a circa 1975 behemoth from the States described as a 'dictionary and guide' will give the flavour: the term 'interface', it seems, *"refers to instruments, devices or a concept of a common boundary or matching of adjacent components, circuits, equipment, or system elements...."* Got that? There's more. *"although the terms 'adapter', 'handshake', 'buffer' have similar meaning, 'interface' is more distinctly a connection to complete an operation ..... a common boundary* [again?] *..... specifications of the interconnection between two systems or units....."*

Oh well. To me — and I suspect to most of us — an interface is most usefully thought of as the plug-and-socket connection by which one or more things attach to another thing. As with yer average domestic electricity supply or a stereo sound system the plug and the socket have obviously got to match up with each other: and, equally obvious, there will be a number of different types of plug/socket connection that might be possible.

The PET connections

Just to make matters really clear, you get a total of five 'plug' connections on the PET — three around the back and two on the side. Basically they are protuberances on the PET's circuit board, and circuit wires end on them — just as a 13A electrical plug carries three wire-endings. And into them you shove a female 'socket' on a cable at the other of which is the thing you're connecting to a PET.

On the side are the memory expansion port and the second cassette interface, both of which are highly specific and difficult for the novice to use for anything other than memory expansion or a second cassette deck respectively. The second cassette port can be used to take power for some external device, though — the ICI GammaTrol interface is one that uses it. And see the 3D entry for an interesting application of the memory port.

In the slot at the back you have the primary cassette interface for attaching one simple, low-speed I/O device like a cassette unit: it's not much good for anything else. Back there too is the interesting user port, a parallel interface "for connecting non-intelligent peripherals and user-built devices" as Commodore puts it. And there is the trusty IEEE interface, the standard way of attaching to the PET just about anything else ..... including, of course, the standard CBM peripherals like disk and printers.

Plugging something into the right socket isn't all there is to it, obviously. You also have to program the interface, to make sure the right signals are going down the right wires to achieve the right results. These days there are many suppliers of the hardware side of interfacing, both in terms of custom-made plug-and-socket attachments for specific devices and in terms of off-the-shelf interfaces for standard types of device.

Usually it's the user that has to provide the appropriate programming, since the interface suppliers usually don't know exactly what you'll be doing with their black boxes — except in the case where they also supply the device. That is normally restricted to printer or plotter interfaces, like the Ricoh daisy-wheel printer sold by Small Systems Engineering complete with PET plug or the neat Japanese flat-bed plotter that Digital Design and Development can supply ready to go.

THE USER PORT

In appearance the user port is two parallel rows of 12 connectors apiece. One row was always intended primarily for diagnostic testing, though three of the connections can be used to drive an external TV monitor — vertical and horizontal sync, plus the video signal itself.

The picture quality won't be great, because the PET follows US conventions with a 525-line video signal and of course, on this side of the water we have the Very Much Better 625-line system (hooray!). Some people find that using a TV set with a PET results in a nasty vertical line on the extreme left of the screen; that can be minimised by what Small Systems Engineering somewhat pedantically describes as "careful adjustment of the brightness and contrast controls".

There are more serious difficulties with the 8032, of which more later. But if you have a PET with the 40-column screen and you want an external large-screen monitor yourself, there are several ready-made interfaces available that plug straight into the user port. Alternatively Nick Hampshire's *The PET Revealed* includes a circuit diagram and some explanation with which you can probably wire it up yourself — if you have a small amount of electronic competence and a soldering iron.

In those circumstances you are probably qualified to try another of Nick's throwaway tips and hints. Three of the remaining connections on the top row of 12 are concerned with cassette I/O, and *The PET Revealed* suggests they could be used to link several PETs: the 'write' output of one could be attached to a 'read' input on another, and vice versa.

Independently Programmable

The bottom row comprises eight I/O lines plus two grounds and two handshaking lines. The important point is that the eight I/O lines can be programmed independently to function as individual inputs or outputs. In other words, as Nick Hampshire's book succinctly puts it, "the user port should not be considered as an eight-line data bus like the IEEE but rather as a set of eight independent I/O lines".

The PET Revealed is available from most Commodore dealers at £10, or from Nick's company, Computabits. Also useful on the user port, albeit at a more modest level, is the £9.95 *PET Personal Computer Guide* by Donahue and Enger, an Osborne/McGraw-Hill publication, similarly available from dealers or by mail order from Audiogenic Ltd.

Back to the external TV connection. On the 80-column PET Commodore apparently has an unusual sync frequency, one that is outside the range of a standard video monitor. That makes it well nigh impossible to get the picture locked in properly — especially for the horizontal synchronisation. But in the SuperPET Commodore has for the first time used a standard CRT controller, and that means the display control can be reprogrammed via series of POKEs.

Small Systems Engineering for one has a £35 user-port interface that gives you all you need to drive an external screen from the 8032 PET. But with this you can't have it both ways — when you switch on you get a good picture on the PET itself and a horrible unsync-ed mess on the TV, when you swtich to the monitor you get a reasonable picture there (monochrome, naturally) with nothing very good on the PET's display.

Sadektronic's £295 *Chromadaptor,* the full-colour-from-your-PET add-on that Terry Hope raved about so enthusiastically in our February/March issue, also plugs into the user port. In this case though the original video controller is physically removed and replaced.

THE IEEE INTERFACE

The IEEE is the American Institution of Electronic and Electrical Engineers. Among other activities it sets standards for its industry; and in terms of interfaces, its most notable effort has been what is now commonly known as the IEEE 488 standard. Like other interface standards (and there are several others) IEEE 488 defines what the wires in a particular plug-and-socket connection actually mean.

Back in the mid-70s Commodore caused some eyebrow-raising when it produced a computer using the IEEE 488 layout for its own standard interface. The PET was an 'appliance' computer apparently aimed at a target market of enthusiastic hobbyists: IEEE 488 was a lab technicians standard.

IEEE 488 is referred to by some people (notably Tektronix, which has espoused it right from the start) as GPIB —

General Purpose Interface Bus. Any way you cut it, it's basically the same interface spec as one Hewlett-Packard developed in the early 1970s and proposed to the IEEE for wholesale adoption. HP's version is still in use as the HP-IB, Hewlett-Packard Interface Bus: it's practically the same as IEEE 488, but as with all standards, some latitude is allowed in interpretation of the specification — and that means you cannot automatically assume that all HPIB-compatible devices will plug straight on to a PET.

Anyhow, the aim of Hewlett-Packard was to design an interface that would be suitable for attaching laboratory instruments to computer controllers — not exactly the same kind of environment as you would demand for the disks and cassettes and printers and suchlike that you might want to plug on to a general-purpose microcomputer.

And RS232C.....

As it happens, there is an alternative standard developed for precisely that kind of requirement in the form of RS232C. This was produced by another American body, the Electrical Industry Association, and it has been adopted more or less wholesale by the world's PTTs* as CCITT Recommendation V24. Since CCITT Recommendations have the force of Holy Writ, that means RS232C is enshrined as a convenient standard for transmitting data over phone lines as well as merely between local bits of a computer system.

RS232C isn't necessarily any better from a technical point of view than the IEEE/HP offering: but it is widely used by minis mainframes and other micros. So there are a good many off-the-shelf products like printers, VDUs and other I/O devices which use the RS232C connection as standard. That means there's a wide range of devices which plug straight into most other minis and micros.

It's clear that the choice of IEEE reflects the background of PET's designers (pretty traditional electronic engineering, really, even they were applying their skills to exciting new gadgets like calculators and digital watches). It also mirrors the ready-made market Commodore's designers saw in providing themselves and people like them with a low-cost alternative to Hewlett-Packard's gear, which has never been cheap — particularly when it has to be used on the relatively simple applications like data logging. Instrument control often doesn't need very sophisticated configurations; you can frequently get by with an 8K cassette PET. So the PET as a sub-£500 controller looks very attractive to engineers and technicians.

But an unkind commentator might also argue that by forcing PET users on to the IEEE standard, Commodore effectively cut down the number of instantly available add-on products — and thus it removed most of the potential competition for its own disks and printers. It's true that there are now at least three thousand commercially-available IEEE-compatible devices which can attach more or less instantly — but *almost* all of them are lab instruments.

Interfaces Off-the-Shelf

But PET's appeal as a controller was obviously subject to the supply of appropriate interfaces. A cheap controller is no big deal if you have to order expensive custom-made circuits to actually attach your I/O devices. It takes time, effort and money for an independent to develop a specialised capability in something like IEEE 488. Eventually, of course, the user community for the PET has grown so large that it has become a worthwhile market for the independents: and low-cost off-the-shelf interfaces from small, sensibly sympathetic companies have become available. That, after all, is what this survey is all about.

The IEEE interface on the PET allows you to attach at least 15 separate devices via the one port. Depending on what they will have to do and how cleverly you can control the interaction with them, it could be many more.

In practice, the actual connection part on the PET is generally done by plugging in a 'PET-to-IEEE' cable which effectively comprises a flat socket at one end (to fit the connectors on the extension of the main PCB) and a more plug-like two-decker connector at the other — the cable is really there just to change the shape of the plug. That plug can fit into sockets in the CBM peripherals; other IEEE-to-IEEE cables can also be screwed on to it in piggy-back fashion, and that is how other devices are connected to the PET. This ability to daisychain several devices on to one port is a major plus for IEEE as a general-purpose interface.

Incidentally, it is worth noting that many of the suppliers listed here (and the dealers who stock their products) can sell you made-up cabling at competitive prices. What's more, they may also be able to save you money on the multi-way piggy-back connection: 3D for one has a neat £20 gizmo which is just a square plastic sandwich enveloping four flat PCB-type connectors. One of those edge-connectors can be linked to the IEEE port on the PET, so you don't have to use the screwed-together IEEE-standard plugs to get three devices on to one PET.

The IEEE connection actually utilises 16 wires. Eight of them carry device addresses and data (one byte, obviously, as eight bits travelling simultaneously and in parallel); the others are used for control and management.

How IEEE-488 works

As with other electrical interface specifications, what happens is that the status of the control/management lines define the condition of the link between the PET and the devices with which it wants to communicate. One line, ATN, is activated to gain the attention of everything that is connected: it indicates that whatever is on the eight data lines will represent control information or a device identifier. Three more lines perform the handshaking, the process in which the 'talker' (usually the PET) and the 'listener' device(s) tell each other how they are — when activated the three lines signify respectively 'I'm not ready for data', 'I have not accepted your data', and 'Your data is accepted as valid'.

Another control line carries a signal that resets all the connected devices when the PET itself is reset or when it is switched on in the first place. Of the other three lines, one can be set by a device to request attention from the PET: another is permanently set to prevent devices returning to local control: and the third is a message terminator, set to indicate that the byte currently on the data lines is the last one for now.

In effect the IEEE specification also defines the software required to transfer data across the connection. The commands implemented for this vary from one computer to another, naturally. Since the PET is characterised by its memory-mapped I/O, so that all input and output can be treated really as memory locations, it is quite easy to program the interface — in BASIC you OPEN a logical file and assign it to a particular device on the IEEE port, then use GET, INPUT or PRINT to read and write.

All but one of the IEEE lines can be accessed via PET BASIC. Machine code will let you get all of the IEEE lines, and of course it will drive the interface a good deal faster.

You have to assign unique identifying numbers to the devices attached. They can be in the range 0 to 31. Numbers 0 to 3 are reserved for the built-in peripherals — the keyboard is 0, the first cassette is 1 and the second 2, the screen is 3. The printer is usually device number 4; the Commodore disk is normally 8.

Those are called primary addresses, but the IEEE bus allows you to specify secondary addresses as well. Each primary can have up to 32 secondaries, which is how you get to attach so many separate devices to the one IEEE port. So you'd use a command like OPEN 1,12,20 to assign logical file 1 to a device with primary address 12 and secondary address 20.

Recommended reading here is the Osborne/McGraw-Hill opus by Eugene Fisher and C.W. Jenson, explicitly entitled *PET and the IEEE 488 Bus* (price about £10). It tells you just about everything you need to know for building your own interfaces, how to use someone else's, and how to program for the IEEE port. It includes sample circuit diagrams and interface programming considerations required by various specific and exemplary devices — voltmeter, frequency counter, a printer, Tektronix logic analyser. All in all, it manages to give a large selection of programming illustrations in BASIC, and it also reprints John Cooke's classic machine-language handshaking routine which happens to drive a Hewlett-Packard voltmeter but which shows you in some detail exactly what's involved.

Nick Hampshire's books also has a good section on the IEEE port and how to use it, though his somewhat discursive style and buckshot approach to imparting information does occasionally conceal the nuggets. And a third required read comprises a series of two Kibasi/Mills articles on IEEE and its uses printing in the January and February 1980 issues of *Personal Computer World* — heavy going for the non-technical novice maybe, but like Nick Hampshire, these guys know their stuff.

Dennis Jarrett continues his investigations into the world of interfacing in the next issue, with a product by product report on the wide range of interfaces now available for the CBM/PET.

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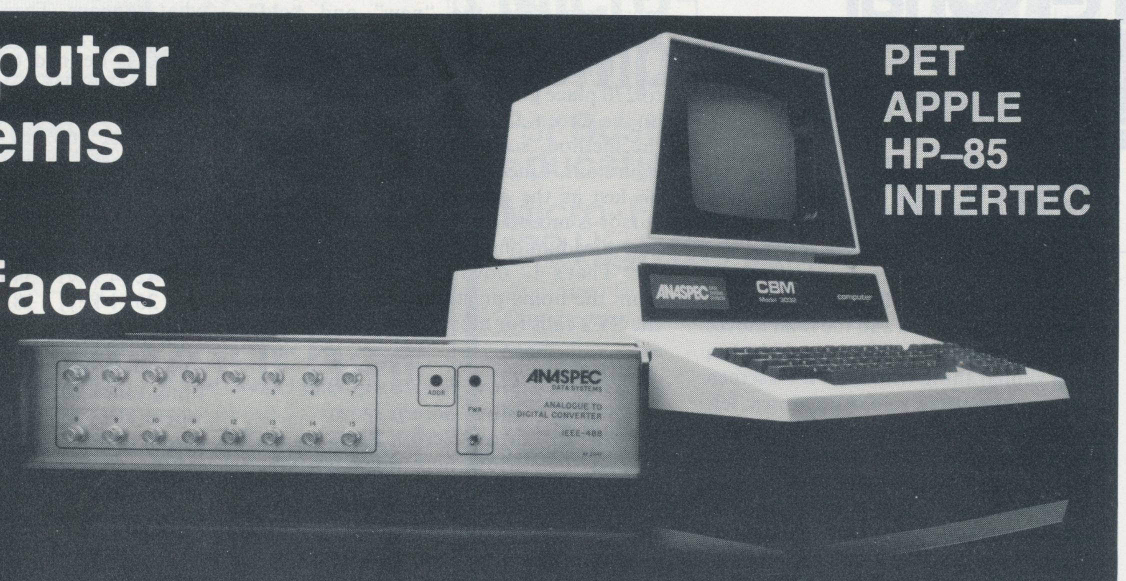
*National telecommunications organisations.

Computer Systems and Interfaces



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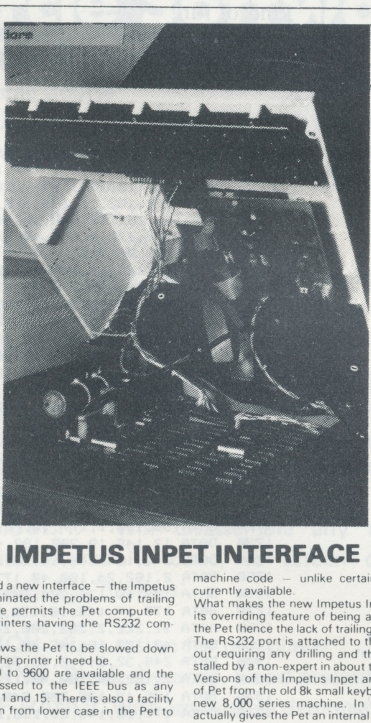

IMPETUS INPET INTERFACE

Impetus have introduced a new interface — the Impetus Inpet — which has eliminated the problems of trailing leads. The new interface permits the Pet computer to use a wide range of printers having the RS232 communications mode.

Full bi-directional, it allows the Pet to be slowed down to wait for the speed of the printer if need be.

All baud rates from 110 to 9600 are available and the interface can be addressed to the IEEE bus as any device number between 1 and 15. There is also a facility for automatic conversion from lower case in the Pet to true Ascii lower case.

With the Inpet interface, the Pet can also communicate either directly or over the telephone with other, much larger computers and may be driven either from Basic or machine code — unlike certain other new products currently available.

What makes the new Impetus Inpet special however is its overriding feature of being able to fit wholly within the Pet (hence the lack of trailing wires!)

The RS232 port is attached to the side of the Pet without requiring any drilling and the interface may be installed by a non-expert in about ten minutes.

Versions of the Impetus Inpet are available for all types of Pet from the old 8k small keyboard versions up to the new 8,000 series machine. In fact the new interface actually gives the Pet an internal RS232 capability which it previously did not have.

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Personal Electronic Transactions

In some video games you are driving a car along a roadway. The car remains in the center of the screen and the road moves down the screen. I thought it would be fun to do a similar thing with the PET's screen by moving the *entire* screen up, down, left or right with wraparound. Characters going off one edge of the screen will appear on the opposite edge.

Since this means moving some 1000 characters around, I wrote these functions in machine language to be called by the SYS function. You don't want to wait 30 seconds to shift the screen one position.

I then wrote a small "drive-it-around" program to illustrate how these subroutines may be used. Figure 3 shows the HEART DRIVER program as listed on my printer. (There's far too many DATA statements to attempt typing via my Selectric without errors. Unfortunately, it takes only *one* error to smash machine language!)

Before looking at the program in detail, some of the listing rules need to be explained. If you look at Line 100, you will see the phrase ROUTINEsp LOADED. The "sp" indicates that a blank went between the two words. On Line 170, the letters M, B, and N are preceded by the tilde (~) mark. This means that the graphics characters Shift-M, Shift-B, and Shift-N are used here. If you make the substitutions, the familiar numberpad-moves diagram will appear. Note that blanks, i.e., between the "sp"s do *not* count. To be precise, blanks in a program line are in the program, except inside quote marks. *All* blanks in quotes are replaced by "sp"s.

Cursor movements are indicated by "up", "dn", "lft", "rt" for Cursor Up, Cursor Down, Cursor Left, and Cursor Right, respectively. In Line 530 is a "rvs" which stands for the Reverse Field key.

So, how does this thing work? Lines 10 through 100 read the DATA statements and put the 6502 code into the first and second cassette buffers. (Take heed! No Tape I/O permitted!). Unfortunately I couldn't fit it all into the second cassette buffer.

Line 110 is a delay to show the ROUTINE LOADED message, and Line 115 eats up any characters in the input buffer. The program returns to Line 115, and up to 9 characters may be lurking to be GETted. Lines 120 to 230 give instructions and wait for a keypress to begin.

Line 240 defines where the "currently down key" location is. For "old" PETs this is 515, and "new" PETS use 151. Location 50003 is a zero for "old" PETs and a one for "new" PETs. This is a convenient way to make programs run on both model ROMs. (Thanks to Len Lindsay for this tip. See the July 79 *Kilobaud*, Pg 72 for more regarding the "new" and "old" ROMs.)

Line 250 clears the screen. Lines 260 to 270 place grouips of Shift-Q (solid balls) on the screen. I don't have room to explain the method, so it is a puzzle for you to figure out. Line 275 puts the heart symbol on last as the goal to reach. In 280, the cursor is moved to the center of the screen and the diamond printed to indicate the car. That's 12 down and 19 to the right from the home position. Line 290 defines the SYS calls for moving the screen. These are:

863	U	Move Screen Up One Unit
905	D	Move Screen Down
793	R	Move Screen Right
827	L	Move Screen Left

```
HEART DRIVER

 10  AD=690
 20  READ B:IFB<0 THEN 100
 30  POKE AD,B:AD=AD+1:GOTO20
 100  PRINT"ROUTINEsp LOADED"
 110  FORJ=1TO500:NEXT
 115  GETA$:IFA$>""THEN115
 120  PRINT"clr WOULDsp YOUsp LIKEsp
        TOsp GOsp FORsp Asp SPIN?
 130  PRINT:PRINT"JUSTsp PRESSsp THEsp NUMBERsp KEYS
 140  PRINT"TOsp DRIVEsp YOURsp CAR.....
 150  PRINT
 160  PRINT"sp sp sp 7sp sp 8sp sp 9
 170  PRINT"sp sp sp sp ~Msp ~Bsp ~N
 180  PRINT"sp sp sp 4~Csp 5sp ~C6
 190  PRINT"sp sp sp sp ~Nsp ~Bsp ~M
 200  PRINT"sp sp sp 1sp sp 2sp sp 3
 210  PRINT
 212  PRINT"YOURsp GOALsp ISsp THEsp ~Ssp SPOT
 214  PRINT"GOODsp LUCK.....
 216  PRINT
 220  PFINT"PRESSsp ANYsp KEYsp TOsp BEGIN...
 230  GETA$:IFA$=""THEN230
 240  PK=515:IFPEEK(50003)THENPK=151
 250  PRINT"clr ";
 260  FOR J=1TO20+15*RND(1)
 262  W=32768+1000*RND(1)
 263  FOR K=1TO10+15*RND(1)
 264  ON1+4*RND(1)GOTO265,266,267,268
 265  W=W+1:GOTO269
 266  W=W-1:GOTO269
 267  W=W+40:GOTO269
 266  W=W-40:GOTO269
 269  IFW<32767ORW>33767THEN262
 270  POKE W,81:NEXTK,J
 275  POKE32768+1000*RND(1),83
 280  PRINT"dn dn dn dn dn dn dn dn dn dn dn dn
        rt rt rt rt rt rt rt rt rt rt rt
        rt rt rt rt rt rt rt rt ~Zlft ";
 290  U=863:D=905:R=793:L=827:C=33267

 300  REM LOOK FOR MOVE
 305  T=TI
 310  Z=PEEK(PK):IFZ=255THEN310
 320  IFZ=34THEN310
 330  PRINT"+lft ";
 340  IFZ=50THEN SYSD:GOTO500
 350  IFZ=18THEN SYSU:GOTO500
 360  IFZ=41THEN SYSL:GOTO500
 370  IFZ=42THEN SYSR:GOTO500
 380  IFZ=58THEN SYSD:SYSR:GOTO500
 390  IFZ=57THEN SYSD:SYSL:GOTO500
 400  IFZ=26THEN SYSU:SYSR:GOTO500
 410  IFZ=25THEN SYSU:SYSL:GOTO500
 420  PRINT"~Zlft ";:GOTO310
 490  REM CHECK FOR COLLISION
 500  Q=PEEK(C)
 502  IFQ=20 OR Q=43 THEN 420
 505  IFQ=83 THEN 530
 510  IFQ=81THEN540
 515  GOTO420
 520  REM COLLISION FOUND
 530  PRINT"rvs lft lft lft lft lft lft
        lft lft lft lft GOTsp THEREsp IN"
        INT((TI-T)/60)"lft sp SECONDS"
 535  FORJ=1TO2000:NEXTJ:GOTO115
 540  PRINT"~Qlft ";
 550  ON 1+4*RND(1) GOTO 560,570,580,590
 560  SYSU:GOTO600
 570  SYSD:GOTO600
 580  SYSR:GOTO600
 590  SYSL:GOTO600
 600  IFRND(1)>.3THEN550
 610  FORJ=1TO500:NEXTJ
 620  GOTO 500
```

```
1000  DATA 255,127,0,128,39,128,136
1010  DATA 2,151,131,191,131,162,11
1020  DATA 181,10,157,122,2,202,16
1030  DATA 248,162,11,189,178,2,149
1040  DATA 10,202,16,248,96,162,11
1050  DATA 189,122,2,149,10,202,16
1060  DATA 248,96,216,24,165,10,105
1070  DATA 40,133,10,144,2,230,11
1080  DATA 24,165,12,105,40,133,12
1090  DATA 144,2,230,13,24,165,14
1100  DATA 105,40,133,14,144,2,230
1110  DATA 15,96,216,56,165,18,233
1120  DATA 40,133,18,176,2,198,19
1130  DATA 56,165,20,233,40,133,20
1140  DATA 176,2,198,21,96,32,190
1150  DATA 2,162,25,32,43,3,32
1160  DATA 222,2,202,208,247,32,211
1170  DATA 2.96,160,39,177,12,72
1180  DATA 177,10,145,12,136,208,249
1190  DATA 104,145,12,96,32,190,2
1200  DATA 162,25,32,77,3,32,222
1210  DATA 2,202,208,247,32,211,2
1220  DATA 96,160,1,177,10,72,177
1230  DATA 12,145,10,200,192,40,208
1240  DATA 247,104,145,10,96,32,190
1250  DATA 2,162,24,160,40,177,10
1260  DATA 145,16,136,208,249,160,40
1270  DATA 177,14,145,10,136,208,249
1260  DATA 32,222,2,202,208,241,160
1290  DATA 40,177,16,145,10,136,208
1300  DATA 249,32,211,2,96,32,190
1310  DATA 2,162,24,160,40,177,20
1320  DATA 145,16,136,208,249,160,40
1330  DATA 177,18,145,20,136,208,249
1340  DATA 32,1,3,202,208,241,160
1350  DATA 40,177,16,145,20,136,208
1360  DATA 249,32,211,2,96
1370  DATA -1
```

Figure 3. **Heart Driver Program**

The listing conventions of this program are described in the text.

If you RUN the program and press the STOP key, try SYS to each of these and see what happens. Then try a loop like FOR J=1 TO 40: SYS 793:NEXT

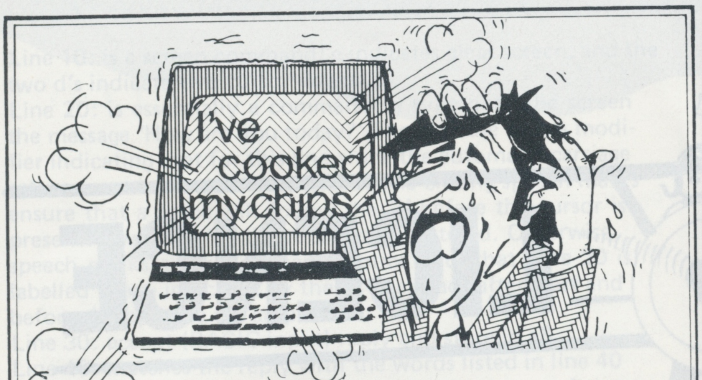
C is defined to be the center of the screen, which is where the car is positioned. The time is noted in Line 305 and Line 310 checks for any key down. (255 is the no keys pressed value.) The PET uses some odd codes to show which key is down, and the values used here are:

58 (7 key)	50 (8 key)	57 (9 key)
42 (4 key)	34 (5 key)	41 (6 key)
26 (1 key)	18 (2 key)	25 (3 key)

I am too short of space to explain how you find these values — a topic for another time. Lines 320 to 410 print a "+" to show where the car was, and then move the screen in the direction opposite to the car's intended motion. This gives the illusion of moving the correct direction. Notice that the diagonal moves are done by two SYS to move Up or Down and then Right or Left. Line 410 corrects for non-directional keys being pressed by restoring the car's image.

Once the move is made, we check for a collision by looking at the screen's center to see what's there. A space or a + is checked for in Line 502, and the heart is looked after in Line 505. (The PET's POKE codes to the screen are *not* the ASC values for the letters. Yet *another* topic!) The game ends in Line 530 with a time taken message and a jump back to the start at Line 115. A collision with a dot produces some random moves in Lines 540 to 600, and then a delay. We again check for a dot, and repeat the collision process until the car lands on a non-dot. Try a crash — it's kind of fun!

Gregory Yob



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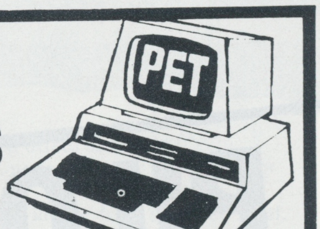

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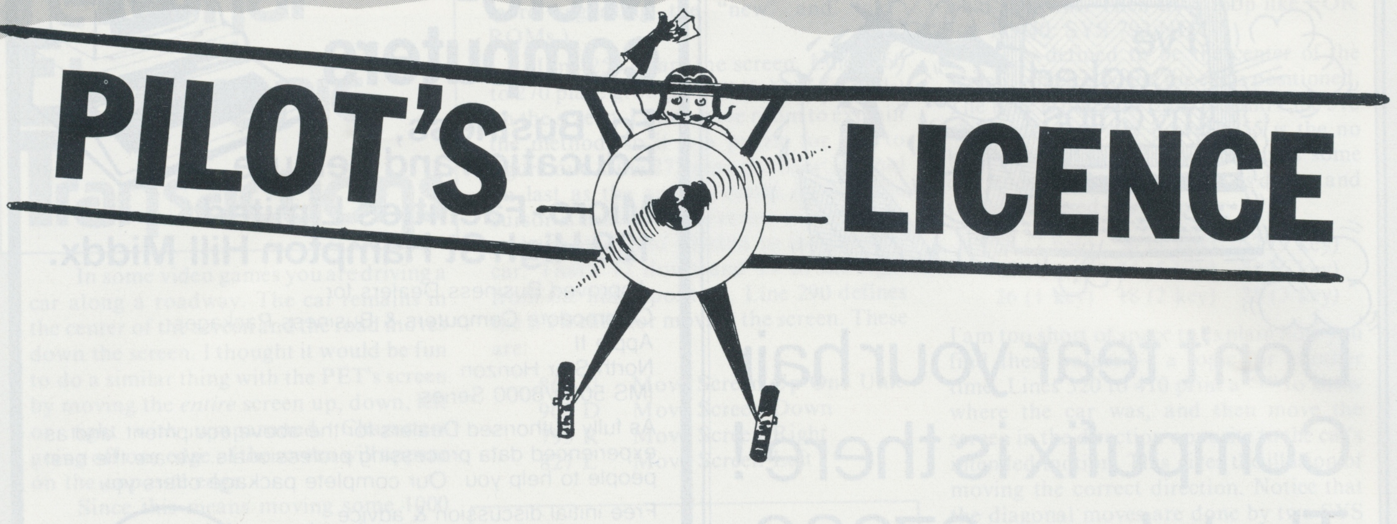

MICHAEL BAWTREE gets airborne with a new version of the easy-to-use PILOT language.

If you have ever been required to talk about something which has really 'grabbed' you and not known where to start, then you'll know my problem.

Michael Bolley and David Parkinson of the Modern Tutorial College (MTC) have produced a package which will be of interest to all educational users of PET systems. Bolley is responsible for the 6502 machine code program called *MTC PILOT* and Parkinson is behind the first rate manual which goes with it.

If you have hitherto been of the opinion that BASIC and Machine Code are the only two languages that one may use on the PET, you're out of date. Once *MTC PILOT* is loaded into your PET you have another language at your fingertips which opens up as many possibilities for the text-laden subjects (English, History, Modern Languages, etc.) as BASIC opened up for the Natural and Social Sciences, to which it is more ideally suited. This is not to say that programs for a particular subject cannot be written in a given language but that sheer weight of evidence indicates that the bulk of educational programs written in BASIC have been for Science orientated subjects involving, in the main, data processing (or generation) and simulation.

Learning to Fly

If you think BASIC is easy to learn and use, you are right. However, *MTC PILOT* is easier! If there is one thing *MTC PILOT* can do better than BASIC, it is handling text in strings. It is the uniqueness and versatility of the MATCH command (more of which later) that makes PILOT so well suited to applications in Computer Assisted Learning/Instruction.

For example, if you wanted to know whether or not the user of the program was well today, and you were writing in BASIC, you would present the user with that very question — "Are you well today?" — because of the simplicity of receiving and dealing with the reply which could only be Yes or No.

But with *MTC PILOT* one may turn the same question on its head and ask the much more open ended and more natural equivalent — "How are you today?" And in reply the user may type in just what he wants from a single letter/word to a paragraph (of a maximum of 80 characters). Whatever is typed in is automatically edited and dumped in the Answer Buffer (aa$ — a reserved label) and will be worked on from there.

PILOT Commands

There are essentially fourteen *commands* or op-codes in *MTC PILOT*, some of which may be modified by one or more *modifiers* singly or simultaneously. To each command may be attached a *conditional* in which case the command to which it is attached is only executed so long as the stated condition is satisfied.

Every line of the program must use a line number as in BASIC, but they are simply there for convenience in listing and editing. Unlike BASIC, *MTC PILOT* uses *labels* of up to six characters in length for use in any type of branching instruction. Each line of PILOT may be up to eighty characters in length but may only contain one PILOT statement. The general form of an allowed line of PILOT is as follows:

```
n      *label  omc:text
```

where n represents a line number in the range 1 to 63999; o an op-code; m a modifier and c a conditional. In general, one may assume each line will have at least a line number, op-code and colon. Other components are optional, e.g.

```
300    *jump20  tr(x=5);That's right
```

This is line 300 which happens to carry a label 'jump20'. t is the op-code meaning type (the text which follows the :) r is the modifier indicating that the text to be printed must be presented in reverse field; and all this will only take place so long as the variable 'x' is equal to 5; hence (x=5) is the conditional.

Consider the following sample program.

```
10 s:odd
20 *start th:How are you today ?"
30 a:$a$
40 m:fine!well!ok!fit
50 jy:first
60 m:lousy!grotty!fed*up!headache!tired
70 jy:second
80 t:I'm afraid I don't understand you.
90 j:start
100 *next
110 e
1000 *first
1010 t:That's encouraging
1020 j:next
2000 *second
2010 t:Never mind - have forty winks -
2020 s:d
2030 t:you'll feel much better.
2040 j:next
```

Line 10: is a screen command; c indicates **c**lear screen; and the two d's indicate two cursor **d**owns.

Line 20: is essentially a command to **t**ype onto the screen the message 'How are you today?' The h of the th is a modifier indicating that for this line alone the automatic carriage return must be **h**ung or suspended. The closing speech marks ensure that a space will follow the '?' before the cursor is presented waiting for the reply to be entered. Otherwise, speech marks are unnecessary. Notice also, that Line 20 is labelled -start- indicated by the *. The space after **start** and before the op-code **t** is crucial.

Line 30: accept (BASIC input) reply and store in a$.

Line 40: **m**atches the reply with the words listed in line 40 separated by '!' If the reply contains at least one of these words the match flag is set.

Line 50: is a **j**ump command modified by the y of jy. The presence of the y ensures that the jump is made only so long as the match flag is set. If it is not set then control passes to

Line 60: **m**atches the reply with the second group of words. N.B. the '*' in fed*up covers the possibility of the reply containing a space or dash. In fact, whatever is entered in place of the * will make no difference.

If both lines 40 and 60 fail neither jumps will occur and Line 80 is executed, typing out the message; after which, Line 90 is executed which is an unconditional jump to the label 'start'.

If the first match is successful control passes to line 1000, labelled 'first'; and similarly, if the first is unsuccessful but the match flag is set on the second, control passes to Line 2000, labelled 'second'. At lines 1020 and 2040 control passes unconditionally to line 100, labelled 'next'. Finally, Line 110 is the equivalent of the BASIC END.

Perks

In addition to the facilities offered by *MTC PILOT* discussed so far, there are numerous other 'perks'. Entering and running *MTC PILOT* automatically sets upper/lower case mode. If instead of upper case mode (say) you wish to be in lower case mode, simply type in LOWER, press return and you are there.

To exit *MTC PILOT* and return control to the BASIC interpreter, type in BASIC, press return and there you are. Similarly, type in PILOT followed by return and you are back in PILOT.

Type in REPEAT, press return and you have the repeat function on all keys, obtained by holding the required key down for about half a second. This REPEAT command will also be found to work in BASIC. To disable the REPEAT function enter REPOFF.

MTC PILOT uses numeric (integer or floating point) and string variables exactly like BASIC. Similarly, there are certain reserved variables names. Further POKEing into memory (and hence onto the screen) is possible, so allowing full implementation of PET graphics in PILOT.

Space here does not permit a full discussion of the automatic editing which may be done on the user's input before it enters the answer buffer. With the compute command 'c' any expression valid in normal BASIC will be evaluated in PILOT.

Landing

A particularly useful feature of *MTC PILOT* is the EXECUTE INDIRECT command which is crucial to advanced PILOT programming. It allows a string or combination of strings to be executed as a single PILOT instruction so facilitating address modification and the like.

If this is not enough, it is also possible to create and use PILOT FILES. Programs are supplied in the package looking after that side of things, assuming you have disks in your system.

In summary, this is a high quality package. The manual is delightfully straightforward and the program package includes DOS SUPPORT 4.0, MTC PILOT, PILOT FILES and a collection of sample programs together with a few sample listings. The price is £65.00 + VAT. *Further information is available from MTC Software, Modern Tutorial College, Kilburn Lane, London W10 4AA. Tel: 01–960 5899.*

MTC PILOT -- SUMMARY

Direct mode commands

new, load, save, verify, list — syntax and effect as in BASIC
plist — list in lower/upper case to Commodore printer, syntax as for list.
run — execute *PILOT* program from first line or from specified label.
goto — continue execution of *PILOT* program from specified label.
? — print values of variables or expressions.
basic, PILOT — transfer between working in BASIC and *MTC PILOT*.
upper, lower — transfer between upper/graphics and lower/ upper modes.
repeat, repoff — enable/disable repeat facility on all keys.

The commands > and / may also be used if DOS SUPPORT is loaded and run before *MTC PILOT*. The commands upper, lower, repeat and repoff also function in BASIC.

Programming Language Commands

Command	Modifiers	Name	Action
r:		remark	Go to next line.
t:		type	Print text and/or variable values to screen.
	h	hang	Suppresses carriage return/line feed.
	r	reverse	Print in reverse field.
:			Continuation of text from previous line.
s:		screen	Set upper/graphics g, exit to lower/ upper x, clear c, home h, cursor down d, cursor up u, cursor left l, cursor right r, scroll screen s.
	p	poke	Poke screen or other memory as in BASIC.
a:		accept	Input string, auto-edit and store in answer buffer. Also input string and numeric variables.
	s	single	Get single character.
	x	exact	Suppresses automatic editing.
pr:		problem	Indicates start of problem group, and used to set auto-edit options: clear all options x, remove spaces s, force upper case u, force lower case l, allow escape option e, allow goto option g.
m:		match	perform window string comparison search through answer buffer for specified string(s) and set match flag if successful. Used with special characters * = any character, & = any string, % = space, start or end, ! denotes alternatives.
	j	jump	Jump to next match if current match fails.
j:		jump	Jump to specified label, or to special labels @a = last accept, @m = next match, @p = next problem.
c:		compute	Assign value to simple/array variable as in BASIC. All BASIC numeric and string functions. Also special \ functions: force lower case l, force upper u, capitalise c, remove character\a\ replace character \ ab.
d:		dimension	Dimension numeric or string array as in BASIC.
u:		use	Call subroutine.
e:		end	End program run or return from subroutine. Can be used with label.
xi:		execute indirect	Execute strings or combinations of strings and string variables as a program line.
fo:		file open/ file out	Open to random-access file on Commodore disk drive/write string to specified block of file.
fi:		file in	read string from specified block of PILOT file.

The special commands goto and @(escape) allow the user to jump to a label or call a subroutine *sysx during program execution.
*label indicates the destination of a j:, u:, e: or goto command.

Conditionals

y, n — match flag set/not set.
digit n (1-9) — last accept used n times consecutively.
e — error flag set due to no numeric input.
(relational expression) — expression true.
c - last relational expression evaluated true.

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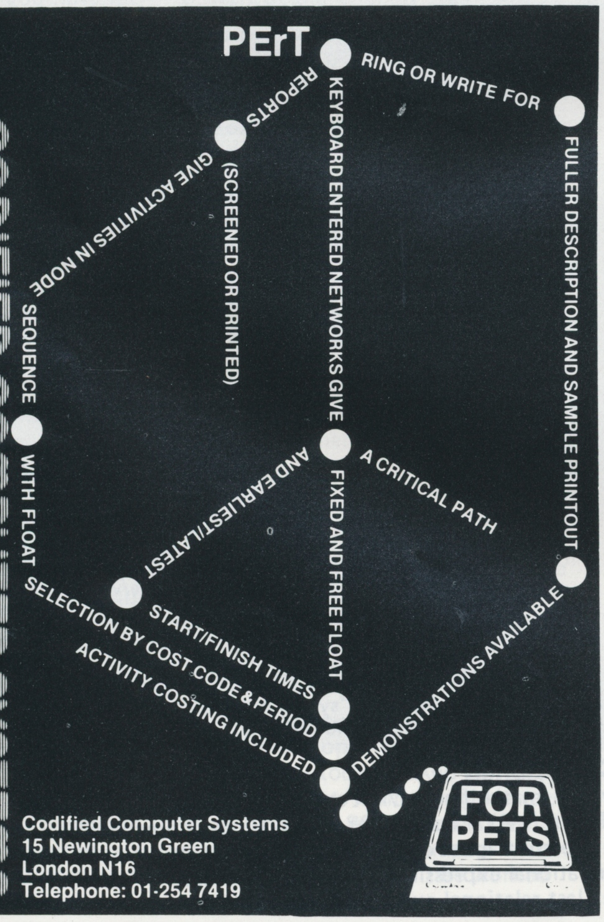
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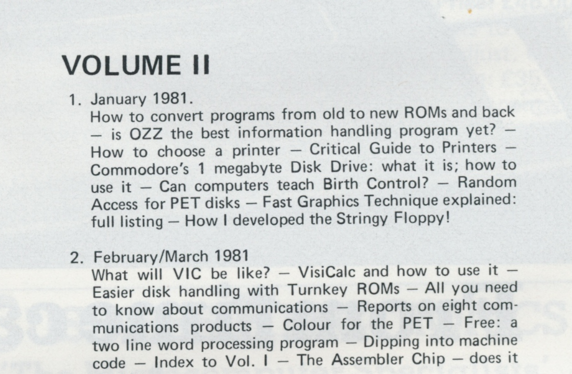

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EFFICIENCY WITH SUBROUTINES

by Michael Richter

Efficient programming is sometimes necessary and always desirable in a microcomputer program. There are two kinds of efficiency, usually in conflict: economical use of memory, and speed of execution. With careful program design, both objects may be achieved in the same code.

The specific methods outlined here deal primarily with the use of subroutines; other techniques are available, and will be dealt with elsewhere. It is possible to design the program from the start in accordance with these methods, but it is usually easier to develop the code without worrying about efficiency, then add features later to save time and memory. In that effort, the Programmer's Toolkit is a valuable aid. I have also written a program ("SUPERLIST") which provides useful cross-reference tables. Those tools are for the Commodore PET, the machine on which the rules were developed; they should apply without modification to all Commodore machines.

WHEN TO USE A SUBROUTINE

A subroutine is a convenient, efficient means of executing a segment of program repeatedly. If the code is called only once, it probably belongs in line - that is, written directly in the place it is used. That saves memory (eliminating both the GOSUB and line number and the RETURN) and speed (the operating system does not have to hunt for the line). When a subroutine is called, the operating system goes to the top of the program and traces through each line until it finds the appropriate line number; that process is slow, and becomes very slow when there are many lines to count. In detail, PET knows where the first instruction is and starts from that absolute address. It checks the line number, and if it is not the one desired adds the instruction length (which follows the line number) to the starting point and repeats the process at the new location. Clearly, the search takes little time per test, but it may have to do many tests to find a number occurring late in the program. Remember, BASIC always starts at the **beginning** of the program.

A similar process occurs with variables. PET files array pointers after variables, begins with the first variable defined and traces to the one you specify. Therefore, the program will run slightly faster if it encounters frequently used variables and arrays before those that occur rarely. In initialisation, it is worthwhile to declare a high-use variable before one that appears seldom. (The time saving is not usually substantial, since there are seldom enough variables in a practical program to make the search take very long.)

There are also times when you may want to make code which is not programmable as a subroutine perform as though it were one. A useful instruction pair for the purpose is the ON ... GOTO. A case in point occurs if an error condition may be found in a common subroutine. It is frequently necessary to jump out of that code for error processing. If a subroutine is used, its call remains on the stack: repeated use will cause the stack to overflow, and PET will give you an "OUT OF MEMORY ERROR". You look at FRE(0), and have plenty of memory left, but the program won't CONTinue. To avoid the problem, use a variable, say DE for destination. Assign it a value whenever the program is "calling" the "subroutine". Instead of GOSUB, GOTO the subroutine. Then instead of RETURNing, use ON DE GOTO the collection of return points. Now, you may GOTO the error code without cluttering up the stack.

FUNCTIONS AND FOR ... NEXT

When a numeric function is used repeatedly in the code, a function may be defined. For example, I employ a packing function FNP(X) to count from 0 through 200 with single characters that PET can INPUT.

It is defined by:

```
DEF FNP(X) = X + 48 + 7*(X>9).
```

The corresponding unpacking function is:

```
DEF FNU(X) = X - 48 - 7*(X>65).
```

Note that a numeric equivalent of an IF test is used; a function must be a single statement, and cannot include an IF. Invoking a function carries along only a single variable (here, X), but other variables or constants can be invoked by writing them into the definition directly. For example, one may declare a variable (say, I) early by putting it into the parentheses of a DEFinition; when the function is invoked, any variable or number may be substituted by putting it into the parentheses. No other term in the definition allows substitution.

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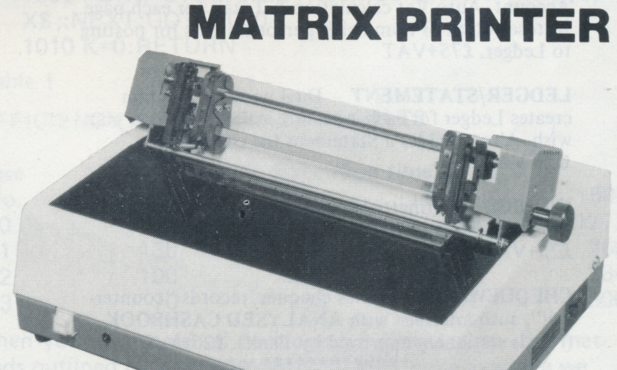

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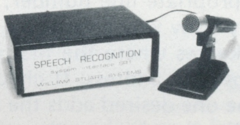

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EFFICIENCY WITH SUBROUTINES

Continued from 51

The FOR ... NEXT loop has many properties of a subroutine, but has different rules for efficiency. The normal execution of such a loop (the one taken most often) dictates its speed. Let's look at a simple loop:

```
1000 FOR I=0 TO 255
1010 IF I <> 19 GOTO 1100
1020 PRINT "HOME";
1040 NEXT I
1100 IF I <> 147 GOTO 1200
1110 PRINT "CLEAR";
1120 GOTO 1040
1200 PRINT CHR$(I);
1210 GOTO 1040
```

That code prints the sequence of characters on the screen, handling two problem characters with special logic.

The first improvement eliminates the GOTO for the 254 cases that are normal, and applies it only to the special two.

```
1000 FOR I=0 TO 255
1010 IF I = 19 GOTO 1100
1020 IF I = 147 GOTO 1200
1030 PRINT CHR$(I);
1040 NEXT I
1100 PRINT "HOME";
1110 GOTO 1040
1200 PRINT 'CLEAR";
1210 COTO 1040
```

Now, the program simply steps along on the normal path without having to hunt for a line number. Only in two cases out of 256 does it have to search.

Another element of efficiency is eliminating unnecessary lines, packing them with colons instead of separate numbers. Each time you do that, you save four bytes of storage and the time needed for PET to step across the line number. Another speed-up and memory saving is accomplished by eliminating spaces; the code is harder to read, but is more efficient. Similarly, we can look for simplification of some statements.

Combining those, we may try:

```
1000 FORI=0TO255:IF(IAND127)=19GOTO1100
1010 PRINTCHR$(I);
1020 NEXTI
1100 IFI=19THENPRINT"HOME";:GOTO1020
1110 PRINT"CLEAR";:GOTO1020
```

Next, let's use the conditional more cleverly; it will save memory, but at some cost in time. We may also use a dummy print variable, X$, to compress the code. When those actions are combined, we can eliminate the GOTO altogether.

```
1000 FORI=0TO255:X$=CHR$(I):IF(IAND127)=19
     THENX$="CLEAR":IFI=19THENX$="HOME
1010 PRINTX$;:NEXT
```

The final step was to eliminate the last "I". It is not necessary to name the variable of a simple FOR ... NEXT loop; the operating system will take the one at the top of the stack when it can. Another undocumented feature is that in nested loops, one may write FORI= ..... FORJ= .... NEXT J,I. I recommend that you name the variable in the NEXT whenever the loop is complex, but save the storage and time (to look up the variable) in very simple cases - such as our example.

LOCATION

Since the time to locate a line depends on how much code is ahead of it (i.e., has lower line numbers), locating programs is important. Putting a high-rate subroutine that is called from many places at a low line number saves in two ways: speed is enhanced since searching is reduced, and memory is saved since there are fewer characters needed in each call. (Although PET stores BASIC addresses as two packed bytes in the listing, within the program they are kept as ASCII strings in GOTO and GOSUB.) The same rule suggests that such rare operations as initialisation be moved late in the program. Therefore, I will often have a strange-seeming beginning to my code:

```
10 GOTO9000:REM M. RICHTER 90064 SEP80
```

The first line goes to the initiation routine and identifies me, my zip code, and the approximate date of the program version. The remaining two-digit line numbers are used for utility subroutines, saving speed and memory.

When you need a very "tight" (high-speed) loop, an incomplete FOR .... NEXT structure is quite useful. Suppose you need to transfer characters between files 2 and 3. You might write:

```
1000 GET#2,X$:IFST=0THENPRINT#3,X$;:GOTO1000
1010 RETURN
```

That's economical in memory, but slooow. Instead, try:

```
1000 FORK=0TO999:GETX$:IFST=0THENPRINT#3,
X$;:NEXT:GOTO1000
1010 K=0:RETURN
```

Table 1

EFFICIENCY IMPROVEMENT RESULTS

Case No.	Size (bytes)	Execution time (jiffies) basic	 +100	 +500
0	132	470	536	1277
1	130	264	268	269
2	100	258	263	264
3	70	298	299	300

When you have finished developing a program, try the methods outlined here to improve it. In the simple example we would have reduced memory from 132 bytes to 70, and in a large program might have speeded execution by a substantial factor. The three cases listed above have been coded, instrumented and run. Table 1 shows the size of each program in bytes and the time it takes to run essentially as listed. In addition, it reports the effect of having 100 and 500 instructions in the code at lower line numbers. Frequently, I find that even good programs can be shortened in execution time by at least 20%; they can be made to release 10-30% of their code with these and similar techniques. Those savings are frequently the difference between products that sell and those that don't.

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16 New Commands for £5

TITLE: Petkom 1
AUTHOR: M. Wirt
AVAILABLE FROM: 12 Alleyn Cr., London S.E.21
PRICE: £5.00
REVIEWER: Geoff Penn

Following in the wake of the excellent 'Toolkit' and other less useful firmware packages comes Petkom 1. This is a cassette-based machine code package which, it is claimed, adds 16 extra commands to one's PET.

This reviewer's first impression of Petkom 1 was one of sheer desparation. Not only did my PET fail to find the program, but so did all those in my local PET dealer's showroom! Back home, two stereo tape decks did the trick.

Having loaded Petkom 1, I was surprised to find that it took 85 seconds for the program to relocate itself into the top of memory, and even more surprised when it crashed the PET by removing ALL commands! Petkom 1 and DOS were having a blazing row down in page zero.

Reset, reload and after another 85 seconds – bingo! – all 1.5K of Petkom 1 was (at long last) rarin' to go – and it was worth waiting for.

There are in fact only six major new commands – clear screen, fill screen, reverse screen, plot, repeat key and shift screen, but some have two or more options, making a total of 16. The commands consist of an exclamation mark followed by one or more characters and can be entered either directly or as part of a BASIC program.

The new commands available through Petkom 1 allow the programmer to

– clear the screen either above or below the cursor, including the line containing the cursor

– put the screen into reverse field

– fill the screen with a character previously POKEd into location 826

– turn the repeat key on and off

– plot, delete and test points in the 80x50 double density format, and to shift the contents of the screen up, down, left or right, either wrapping around or leaving spaces.

A thoughtful 17th command, exit, removes Petkom 1 from memory without the need to reset the PET.

The machine code is efficiently written, but as it uses the first 40 locations in the second cassette buffer for temporary storage, it will overwrite any other useful machine code routines the programmer may have stored there. The last 40 locations may have been a better choice.

Despite that, and the unfortunate loading problem mentioned earlier, Mr. Wirt's well-documented package is quite impressive, and at only £5.00 represents excellent value for money.

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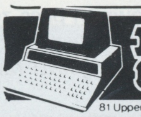

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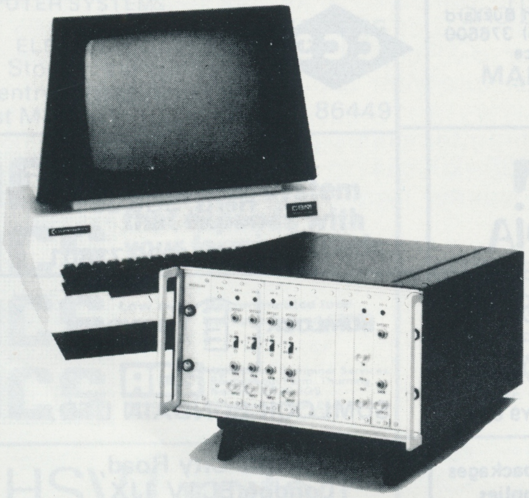

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Peeks & Pokes

Apple's protestations that all is well with Apple III, so readily swallowed by the sycophantic gulls of the computer press, should be judged in the light of the following. Mike Markula, the former marketing genius of Intel who put Apple on the map, has felt it necessary to descend from the Olympian heights of the Chairmanship to kick Chief Executive Scott upstairs, fire 40 executives including Tom Whitehead, father of Apple III, and assume the presidency himself. I expect Apples IV and V to make it before *numero tre* does.

I am sorry to see that following my story about David James and his celebrated 'Fast One' program generator, his backers, Unilever, have backed themselves out of the picture altogether.

A shortage of rhesus monkeys is threatening the adonis-like profile of *PRINTOUT's* second favourite columnist, Gavin Sanders. Long a follower of the Swiss Gerontologist, Dr. Niehaun, Gavin had hitherto successfully repelled the ravages of age by the nightly application of pulverised monkey glands. Now some tiresome do-gooder has objected to the removal of the glands from the live monkeys on the unreasonable grounds that the animals have greater need of them. Personally I doubt it.

I am amused to learn that Gower, promoters of such punch-up prone events as the 'Kill the Software Pirates' conference, have taken on an attractive female bouncer by the name of Sue Rowles. Having single-handedly put to flight a twelve-man COHSE picket, Ian Litterick's motley crew of software pirates presented few problems to the formidable Sue. Putative hecklers take note.

The real mystery of Commodore's lawsuit against Chuck Peddle is their decision to initiate the action in California. The court is mere minutes from Peddle's office, but half a continent away from the Commodore's Pennsylvania H.Q. I predict that once the fuss dies down it will all be quietly settled out of court. If it isn't, the company's senior management could be tied up in litigation until Peddle's money runs out. Which could be a long time. To make matters worse, Jack Tramiel's secretary has just defected to join him.

Medical men are queuing up to examine sufferers from an exciting new form of infirmity, the Sabena syndrome. This obsession with airlines was first noted when Computnig Toady's 'Enery Budgett waxed ecstatic in review of the 'Pan Am' Tuscan. Now there are reports of passengers bound for the San Francisco Computer Faire being force fed Laker-style lunches by a stewardess bearing a marked resemblance to PCW's Desperate Dave Tebbutt.

Expect to see a record entitled 'My PET: How Basic Can You Get' by Moody Blue, Patrick Moraz in the charts soon. Squads of Commodore functionaries are being despatched to record stores with instructions to buy ten copies each.

Memory costs have come down so fast — 64K RAM chips are costing serious buyers $8 apiece — that the boffins are racing to see who can be first with the solid state computer. All operations carried out in RAM and not a disk drive in sight.

You will recall that Commodore's marketing operation in Germany ground to a halt when the name PET was found to belong to someone else. Next it was revealed that PET is French for 'fart'. Now there's further bad news. In German VIC means ..... well, I leave it up to you to guess what.

Behind the delay in the delivery of Commodore's new 4022 printer is a tale of oriental intrigue in which Epson were persuaded to divert the mechanisms to Sharp. The martial arts department of Commodore Japan have been tasked to "investigate".

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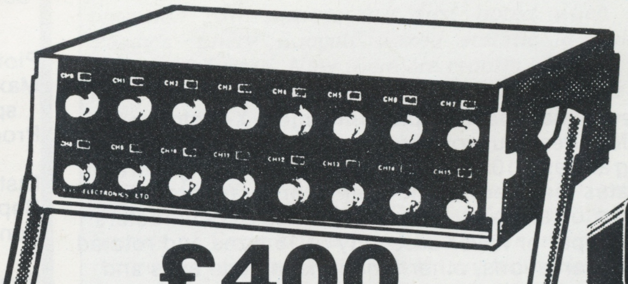

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